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Superfund Record of Decision (EPA Region 3)
Lackawanna Refuse Site, Lackawanna County
Pennsylvania, March 1985

(U.S.) Environmental Protection Agency
Washington, DC

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16. ABSTRACT

The Lackawanna Refuse site is located along a section of the north-south border between the Borough of Old Forge and Ransom Township, in Lackawanna County, PA. Five strip mine pits of five to six acres each were excavated in this area during the last century, and three were later used for waste disposal in the 1970's. One abandoned pit (Pit 5) contains about 15,000 buried drums of hazardous waste as well as municipal refuse. Pit 5 is approximately five acres and is estimated to be 30-50 feet deep. The pit has only a thin cover of soil above the waste. The contents of 20 drums were sampled and found to contain various solvents, paints and thinners, sludges, organic acids, and toxic metals.

The selected remedial action includes: removal of all drums and highly contaminated municipal refuse from Pit 5 for disposal at a RCRA-regulated facility, clay capping (with gas venting systems) of Pits 2, 3, and 5, installation of surface water drainage diversion and construction of a leachate collection and treatment system for all three pits, removal and disposal of the top layer of contaminated soil from the bore hole pit and the access road, reconstruction of the road with appropriate drainage and sedimentation controls, and removal of the dried paint and contaminated soil in the paint spill area for off-site disposal of a RCRA-regulated facility. The estimated total project capital cost for these remedial actions is $8,200,000.

17. KEY WORDS AND DOCUMENT ANALYSIS		
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RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

SITE: Lackawanna Refuse Site, Old Forge, Lackawanna County, Pennsylvania

Documents Reviewed:

I am basing my decision principally on the following documents describing the analysis of cost effectiveness and feasibility of remedial alternatives for the Lackawanna Refuse Site:

- "Remedial Investigation Report": Lackawanna Refuse Site, Lackawanna County, Pennsylvania (NUS Corp. August 1984)
- "Feasibility Study of Alternatives": Lackawanna Refuse Site, Lackawanna County, Pennsylvania (NUS Corp. February 1985)
- "Remedial Action Master Plan": Lackawanna Refuse Site, Lackawanna County, Pennsylvania (NUS Corp. June 1983)
- "Field Inspection Report-Lackawanna Refuse Removal Inc. " (EPA National Enforcement Investigation Center, October 2, 1980)
- Staff Summaries and recommendations
- Recommendations by the Pennsylvania Department of Environmental Resources

Description of the Selected Remedy:

- Removal of all drums and highly contaminated municipal refuse from Pit 5 for off-site disposal at a qualifying RCRA facility.
- Construction of a clay cap over Pits 2, 3, and 5 to meet RCRA requirements.
- Installation of surface water drainage diversion around all three pits and construction of a leachate collection and treatment system for all three pits.
- Construction of a gas venting system through the caps of all three pits.
- Removal of the top layer of contaminated soil from the borehole pit for off-site disposal at a qualifying RCRA facility and returning to grade with a soil cover.
- Removal of the top layer of contaminated soil from the access road and reconstruction of the road with appropriate drainage and sedimentation controls.
- Removal of the dried paint and contaminated soil in the paint spill area for off-site disposal at a qualifying RCRA facility.

- Development of a monitoring program during the remedial action, to include monitoring the existing wells on-site, the gas venting system and the leachate treatment system.

- Operation and maintenance to be implemented by the Commonwealth of Pennsylvania (the State). Quarterly inspections of the site will be performed and any repairs necessary to the cap will be made. The leachate collection and treatment system and any gas treatment found to be necessary through the monitoring system will be operated by the State.

Declarations

Consistent with the Comprehensive Environmental Response and Compensation and Liability Act of 1980 (CERCLA) (42 U.S.C. §9601-9657) and the National Contingency Plan (40 CFR Part 300), and §101(24) of CERCLA, I have determined that the remedial action described above, together with proper operation and maintenance constitute a cost-effective remedy which mitigates and minimizes damage to public health, welfare, and the environment. The remedial action provides for the removal of large quantities of drums of hazardous waste and minimizes the threat of further contamination of the environment. The remedial action does not affect or violate any floodplain or wetland areas. The Commonwealth of Pennsylvania has been consulted and agrees with the approved remedy. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedies. These activities will be considered part of the approved action and eligible for Trust Fund monies for a period of six months following completion of construction.

I have determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other site.

3/22/85

DATE

Stanley L. Laskowski
Acting Regional Administrator
EPA Region III

SUMMARY OF REMEDIAL ALTERNATIVES SELECTION
LACKAWANNA REFUSE SUPERFUND SITE

SITE DESCRIPTION (See Figures 1, 2)

The Lackawanna Refuse site is located along a section of the north-south border between the Borough of Old Forge and Ransom Township, in Lackawanna County, Pennsylvania (at 41°22'35" N latitude and 75°44'55" W longitude). The site is closely bordered by several houses to the east and by the Villa Corporation Trailer Park to the south. Austin Heights, a residential section of Old Forge Borough, is northeast of the site. The area west of the site is forested steep hills. Approximately 9000 persons live within one mile of the site. The local residents do not depend on groundwater as a source of drinking water, but obtain water through a public system derived from reservoirs several miles to the north.

The site is located above the floodplains of the St. Johns Creek and the Lackawanna River. Several intermittent streams and drainage ditches, which generally flow to the south and east toward St. Johns Creek, are located on the site. The St. Johns Creek, flowing along the lower (eastern) edge of the site, is an intermittent stream that is a tributary of the Lackawanna River, which flows into the Susquehanna River. Although there are no downstream users of surface water for drinking for more than three miles from the site, the Lackawanna and Susquehanna Rivers are used for boating, fishing, and recreation. Additionally, the St. Johns Creek flows by another Superfund site (Taylor Borough) and several mine drainage areas before passing the Lackawanna site.

Five strip mine pits of five to six acres each were excavated in this area during the last century, and three were later used for waste disposal in the 1970's. Two pits were used for the disposal of municipal and commercial refuse. Two pits were never used and remain empty. The last pit (known as Pit 5) contains about 15,000 buried drums of hazardous waste as well as municipal refuse. Unknown quantities of bulk liquid wastes were reportedly dumped or spilled from disposal vehicles onto the access road to the pits and into an adjacent depression, known as the "Borehole Pit." (See FIG. 2)

Pit 5 is approximately five acres and is estimated to be 30-50 feet deep. The pit has only a thin cover of soil above the waste. In 1979, the Pennsylvania Department of Environmental Resources (PADER) responded to complaints by local residents of trucks dumping hazardous substances in the open pit. In September of 1980, following the State's investigation and sampling effort, which revealed drums of solvent-like materials onsite, EPA's National Enforcement Investigation Center (NEIC) conducted an assistance investigation, and removed approximately 200 drums from six locations across the pits for sampling. The contents of twenty drums were sampled and found to contain various quantities and mixtures of hazardous waste. These consisted of various solvents, paints and thinners, sludges, organic acids, and toxic metals. A list of what was found includes cobalt, chromium, lead, titanium, molybdinum, and zinc; as well as acetone, ethylbenzene, TCE, chloroform,

methylene chloride, carbon tetrachloride, trichlorobenzene, MIBK, and vinyl chloride. Concentrations in some samples measured 20-30%. No further removal of drums was undertaken since the NEIC investigation.

SITE GEOLOGY

The Lackawanna Valley, a canoe-shaped trough extending both north and south of the site, consists of sandstones and shales, along with numerous deposits or seams of anthracite coal. The coalfield in this valley, known as the Northern Anthracite Field, was mined from the early nineteenth century until the mid-twentieth century. The valley is flanked by ridges of rock. As a result of the folding of the uppermost of the rock units (the Llewellyn Formation), a series of basins have been created with mine pools below them. In the Scranton Wilkes-Barre region a vast series of mine pools extends for miles beneath the Valley and forms the base level for all groundwater flowing through the site. Groundwater collects within a mine pool until it is higher than the structure enclosing it and overflows into the next pool; eventually it is discharged into the Lackawanna River south of the site. Flows from two outfalls about one mile south of the site in the Lackawanna River have been measured at 20 and 40 million gallons per day.

The area containing the pits consists of disturbed glacial till and mine spoil, carbonaceous shale and coal fragments, sand, silt, gravel, cobbles, and boulders. The area east (downgradient) of the site consists of decomposed sandstone fragments overlain by sand and gravel with mine spoils above. Six seams of coal lie under the site. (See FIG. 3)

In addition to the strip mining, the six coal seams underlying the site were extensively deep mined. Mine maps indicate that an additional seam, the Checker, was originally present on parts of the site but was stripped in Pits 1 and 5. It may be inferred that the interface between the spoil and the rock at this location represents the base of the Checker coal (see FIG. 4 for cross-section), since the drilling of Monitoring Well No. 10 required boring through 107 feet of mine spoil before hitting rock.

Subsidence studies and estimates prepared by the Appalachian Regional Council indicate that this site is likely to subside three to twenty or more feet. Because these studies covered a large region of which the Lackawanna site was only a small part, this estimate is broad. According to mine maps on file at the Office of Surface Mining in Wilkes-Barre, four mines were operated under the site, and approximately 50% of the coal was left in place as pillars. We therefore expect future subsidence to range only between three and seven feet. (See FIG. 4, which summarizes findings obtained from the mine maps.)

HYDROGEOLOGY

Air shafts, boreholes, vents, mine shafts and other vertical conduits created by the deep mining and fractured rock have precluded the formation of a continuous groundwater aquifer under the site. It is likely that the groundwater under the site flows to the east but is quickly transported

through the underlying fractured rock to the mine pool. Although site investigations revealed several areas of perched water within the garbage layers and small areas of unconsolidated deposits of shallow water below the site, no continuous system of groundwater was discovered.

The primary threat to the groundwater at the site comes from leachate from the hazardous wastes deposited in Pit 5. This leachate is produced from surface water and rainfall that percolate through the mine spoil and soil cover into the waste. Shallow groundwater flows through the wastes in Pits 2 and 3 and emerges in some areas as seeps, which flow offsite to the Villa Corporation Trailer Park. These seeps probably resulted from groundwater flowing along pre-existing stream drainage areas. In addition, there are smaller seeps in the north end of these two pits that probably resulted from groundwater flowing along the shallow impermeable zones within the old landfilled area. These watercourses emerge from the waste downgradient along the edge of the pits and emanate as seeps which can flow offsite during wet periods.

Much of the water also percolates through the waste into the perched water zones and then through the lower formations into the mine pool. Test pits dug into the waste verified the existence of confined, shallow layers of water moving across the waste, and the monitoring well installed at the eastern side of Pit 5 showed contamination in the groundwater similar to that found in some of the leachate seeps at the site. Borings drilled near the creek and the drainage ditch downslope of the pits encountered no groundwater that would discharge to the creek. Although a well was placed in the minepool beneath the site, no contaminants from the site were measured, probably due to the enormous volume of the pool diluting small amounts of contaminants to below background level. Moreover, the lack of a continuous groundwater system below the site precludes effective monitoring of contaminants from the pits.

In sum, there is no continuous groundwater flow at the site. Shallow groundwater passing through the waste carries contaminants across the site as it emerges as seeps and leachate streams. The remainder of the groundwater migrates down to the minepool beneath the site.

SITE HISTORY

The Lackawanna Refuse site consists of five strip mine pits excavated in the nineteenth century and used in the 1970's as a permitted municipal refuse landfill. In 1973 a State permit was issued for the disposal of solid wastes with the condition that the leachate collection system approved in the permit application be installed within sixty days after receiving notification from the PADER. In 1978 the permit was modified to allow disposal of sludges. Pits 2 and 3 were used for the disposal of municipal refuse alone; each of these pits is approximately six acres. After these two pits were filled to capacity in 1976, Pit 5 was used for refuse disposal. This pit, as well as Pits 2 and 3, were unlined. Boreholes, airshafts and rock fractures allowed wastes to migrate via seeps and shallow groundwater from the pits. The leachate collection system was never installed.

In March 1979, the PADER issued an order suspending the solid waste permit and requiring immediate cessation of the landfill after discovering evidence of the dumping of industrial wastes and pollutants into Pit 5. The order also required Lackawanna Refuse to dig up and dispose of buried drums containing hazardous wastes and all contaminated soil. The PA DER issued a second order in 1979 requiring the Company to construct and operate a leachate collection system. The Company failed to comply with these orders, and the owner, Peter Iacavazzi, Sr., was brought to trial in 1982 in the State court on criminal charges and found guilty of illegal dumping. He was subsequently released after taking into account his advanced age and poor physical condition. He also pleaded guilty to failing to notify EPA that hazardous substances were disposed of and paid a $30,000 fine.

During pre-trial hearings, operators of trucking firms testified that they brought drums of hazardous waste to the site and dumped them into Pit 5. Estimates ranged between 10,000 - 20,000 drums, although one truck driver estimated the quantity to be closer to 500,000. There were also allegations that radioactive waste was disposed of at the site in heavy drums that were lined with some thick material. Other information gathered during this time included allegations that bulk liquid wastes were disposed of in a depression on the hillside known as the "borehole pit", and that some amount of liquids were sprayed on the access road to the site for dust control.

In 1978, a cloud of white "vapor" was released from the site when a truck driver allegedly dumped his load of waste into the pits. The gases from this release moved down the mountainside and caused eye irritation and breathing difficulty in the residents of Old Forge. The immediate area was evacuated by the local authorities during this incident. It is the potential for this kind of release that most alarms the local residents and has created an active citizen group involved in the selection of a remedy for this site.

In 1979, the PADER investigated the conditions in Pit 5 by excavating some of the area and drums. In 1980, the State requested EPA assistance and the Region responded by coordinating with the National Enforcement Investigation Center (NEIC) to conduct further excavation and analysis of the drums in Pit 5. NEIC excavated seven test areas in Pit 5, uncovering 200 drums at depths of five to thirty feet below the surface of the pit. Approximately 90% of the drums were found to be broken or crushed when they were excavated.

Analysis was performed on twenty of the drums containing liquids or sludges and the results showed high concentrations of solvents and paint waste material with high metal and solvent contents. Metals found included

cadmium, chromium, copper, lead, and mercury. Organics included benzene, toluene, methylene chloride, carbon tetrachloride, ethylbenzene and trichloroethylene (see FIG. 7). No evidence of the disposal of radioactive waste was observed in these or any subsequent investigations at the site.

A site investigation by the Environmental Response Team (ERT) in 1982 revealed volatile organic vapors being released from Pit 5 at low levels. These gases included vinyl chloride, a known carcinogen. Data collected were used in applying the Hazard Ranking System to the site, which resulted in an overall score of 36.57. A Remedial Action Master Plan (RAMP) was prepared in June 1983, and the Remedial Investigation, Feasibility Study (RI/FS) workplan was prepared in August 1983. Work on the RI began the same month.

Removal activities were conducted at the site in September 1983 when EPA installed a chainlink gate at the beginning of the access road to control vehicular traffic, and a chainlink fence around all three pit areas to prevent unauthorized access to the site.

CURRENT SITE STATUS

A RI was conducted by NUS Corporation during the period August 1983 to November 1984. A brief summary of the findings follows; for clarity, they are grouped according to specific site locations and specific environmental concerns.

A. Site Locations

- PIT 5:

NEIC performed its excavation test of the site in 1980. At that time they uncovered 200 drums from six locations across Pit 5 and from depths of five to thirty feet below the pit. The contents of eighteen of these drums were analyzed and found to contain high concentrations of solvents and some heavy metals. No further excavation was performed in Pit 5 after the NEIC report.

Magnetometer and vertical electrical soundings were conducted to locate concentrations of drums buried in the pit. According to this data, there are approximately 15,000 drums buried on the site, and they are not confined to any one area or "cell" of the fill (which is approximately thirty to forty-five feet deep). According to the results of the NEIC studies and testimony by former site operators, the majority of the drums are crushed or broken. The waste material and garbage immediately surrounding the broken drums are thought to be contaminated with the contents of the drums. Major contaminants found during sampling were cadmium, chromium, copper, lead, nickel, mercury, titanium, benzene, ethylbenzene, toluene, methylene chloride, and TCE (see FIG. 7).

The groundwater in the area of Pit 5 was monitored in Well No. 4. Although only several inorganic chemicals were found above background level, many organic chemicals were detected at high levels. These include acetone, 2-butanone, 1,2-dichloroethane, methylene chloride, phenol and toluene. The monitoring well in the mine pool was not able to detect any of these compounds, but this may be because of dilution and/or the flushing action of the pool water. Most other wells had little or no water and this water showed little contamination. (See FIG. 6)

Leachate seeps from Pit 5 were sampled and found to contain some low level inorganic contamination and higher levels of organics, including 2-butanone, 4-methylphenol, isopherone, and diethyl phthalate at concentrations ranging up to 2,400 ppb. (See FIG. 7)

Air monitoring during site visits detected only one incident of a measurable air release. This occurred as a transient photoionizer reading near a leachate seep in Pit 5 on a hot day. No air sampling was done at that time, and the release was not measureable a few yards away.

. PITS 2,3:

Magnetometer readings at these pits were similar to those obtained over Pit 5, which is known to contain approximately 15,000 drums. A set of exploratory excavations was performed in April 1984 and again in November 1984 using the magnetometer readings as guides. The first set consisted of shallow excavations (less than 10 feet), and the second set consisted of two excavations dug approximately thirty feet through the fill until clean undisturbed soil was found for five to six feet. Because these excavations turned up only several five-gallon pails and one thirty-gallon drum in the several thousand cubic yards of material excavated, it may be inferred that the municipal refuse in these pits contains the typical amount of commercial or industrial waste (e.g., household solvents and cleaners and paint wastes from non-commercial use). Leachate containing both organic and inorganic contaminants leaves Pits 2 and 3 and migrates to the Villa Corporation property south of the site. (See FIG. 7). No air releases were measured at Pits 2 and 3.

. BOREHOLE PIT:

Reportedly, bulk liquid wastes were dumped into this area (about 4,000 to 5,000 square feet) during the operation of the site. It is likely that any boreholes in the pit would have transmitted the waste down to the mine pool under the site. A thorough visual examination of the pit revealed no sign of any boreholes, but they were probably filled in naturally through erosion and sedimentation over the years.

Sample analysis shows very low levels of contaminants in the soils from the Borehole Pit. One soil sample from the surface (SO-26) showed slightly elevated levels of cadmium, copper, nickel, tin and zinc. Only tetrachloroethylene and toluene were measured in the soil and then only at near the detection limits (ND - 3.5 ppb). It is suspected that the contamination is confined to the upper layer of soil due to the known low migration properties of the metals in soils. (See FIG. 8)

. ACCESS ROAD:

The local residents report that liquid hazardous wastes were disposed of on the surface of the access road as a method of dust control. Leachate from the area behind Pit 5 flows across the road and into the surface drainage ditches or into the borehole pit. Analysis of the road area soils reveals very low levels of contamination by either inorganics or organics. Slightly elevated levels of cadmium, iron, manganese and zinc were found, along with low concentrations of two phthalates at 1.5 and 1.6 ppm, and toluene at 5ppb. The source cannot be determined, however, since contaminated runoff and leachate have probably flowed across the road periodically since the operation of the facility. (See FIG. 8)

. Paint Spill:

A small area of dried paint (approximately 100 square feet) is located along the side of the access road. Tests show that this paint is a RCRA-defined hazardous waste, since it can leach toxic heavy metals (e.g., lead).

B. Environmental Concerns

. OFF-SITE WELLS:

Three off-site wells are located in the area near the site. None of these wells are used for drinking water, but they were analyzed as part of the RI. Dieldrin, a pesticide, was found in one well (See FIG. 5). Although the source of this contamination is unknown, there appears to be no connection between the well and the groundwater or surface water that flows from the site. Soil analysis at three homes near the site showed only slightly elevated zinc levels, which may be related to the composition of soil native to that area.

. LEACHATE:

Leachate has been observed emanating from Pits 2 and 3 and leaving the site area to the south. This leachate contains both organic and inorganic contaminants derived from the flow of shallow groundwater and infiltration through the garbage in the pits.

Some leachate has also been identified with the Pit 5 area and emanates from the spoil area east of the pit. Analyses were performed on the leachate seeps which emanate from Pit 5. These seeps are known to flow both to the Villa Corporation property south of the site, to the

borehole pit, and to the intermittent drainage ditches flowing into the St. John's creek. Once again, these analyses showed low concentrations of metals and higher concentrations of organic contamination. The organic contaminates include acetone, benzene, 2-butanone, 2-hexanone, toluene, vinyl chloride and xylene. (See FIG. 7)

Surface water flowing across Pit 5 and out of the north end of the pit was analyzed and also found to contain acetone, 2-butanone, 1,1 dichloroethane, 1,2 dichloroethane, methylene chloride, toluene and xylenes, along with other organics. Analyses of other seeps onsite show similar or higher contaminant levels. It is possible that, as a result of the groundwater and infiltration percolating down to the mine pool, there are fewer seeps near Pit 5 than there are near the other two pits. The seeps near Pit 5 lie close to the surface, where insufficient soil cover may have allowed contaminants to be flushed from the surface over the years. In contrast to the seeps from Pits 2 and 3, which lie at the base of the fill and can form shallow groundwater that flows through the garbage in thin layers, the seeps near Pit 5 do not easily flow through layers, because the pit area is depressed in relation to the surrounding spoil area.

. SURFACE WATER:

The intermittent drainage ditches flowing across the site and to the St. Johns Creek were sampled. The Creek was sampled both above and below the confluence with the drainage from the Lackawanna site. Results of the sampling showed that in the water column several contaminants, including acetone, 2-butanone and 4-methyl-2-pentanone, increase downstream, but that in the stream sediments, the amount of contaminant compounds increases upstream of the site (See FIGS. 9, 10). The St. Johns Creek, which flows past another Superfund site two miles upstream of this site, probably receives drainage from other mined areas nearby, and this drainage could affect sampling results.

The Old Forge outfall, one mile below the site in the Lackawanna River, was also sampled, and no contaminants traceable to the site were measured. Dilution in the mine pool, however, may have distorted the samples.

. WILDLIFE RELATED TO THE FOOD CHAIN:

Because the local residents hunt game in the area, in 1984 the U.S. Fish and Wildlife Service conducted a study of wildlife living on or near the pits. During this study, voles, mice, chipmunks, and rabbits were trapped at the site. Eleven mice, five rabbits, along with ten fish caught in the Lackawanna River, were examined by a veterinary pathologist, and tissue samples from these animals were analyzed in a contract laboratory. Results of the analyses show that these animals had measurable levels of both organic and inorganic contaminants in their tissue. Most notably, the level of nickel was high enough (1.8mg/kg) to make human consumption of less than six grams of rabbit meat exceed the FDA's allowable daily

intake for nickel. PCB (Arochlor 1260), 1,1,1-trichloroethylene, Dieldrin and benzene were all found in the fish caught in the Lackawanna River at levels that would warrant limiting intake of these fish. It should be noted, however, that the Lackawanna River receives contaminants from many sources other than the Lackawanna Refuse site and that the fish contamination may not be site-related.

ALTERNATIVES EVALUATION

A. Objectives

The major objective of remedial action at the Lackawanna Refuse site is to eliminate or at least mitigate environmental contamination: (1) in Pits No. 2, No. 3, and No. 5, (2) in the borehole pit, (3) in the surface soils and paint spill along portions of the access road, (4) in leachate-affected areas throughout the site, and (5) in the intermittent drainage ditches adjacent to the site.

The overall strategy is to mitigate and minimize harm to the public health and the environment. This should include minimizing further groundwater contamination and the possibility of direct contact with the waste. Leachate control may be an integral part of the overall scheme in order to eliminate the continuing migration of contaminants across the site and off the site to the St. Johns Creek. Implementation of these measures will benefit both the health of the local residents, as well as the environment. Contamination of the food chain will be eliminated by both the prevention of contact with the waste areas as well as the prevention of leachate migration into the local watercourses.

Off-site concerns stem mainly from the leachate flows that migrate from the site to the Villa Corporation property and along the access road to the St. John's Creek. A secondary concern is the potential for a large air release of toxic vapors should one or more drums in Pit 5 rupture and release their contents or react with other constituents in Pit 5. From air tracer studies conducted during the Remedial Investigation, it is known that prevailing winds could carry a release of harmful gases from the pits directly over Old Forge. Although the potential for this sort of occurrence is remote, the proposed action should nevertheless address the possibility of this sort of release.

A final site concern, raised by the U.S. Fish and Wildlife Service (which conducted the animal studies at the site), is that the animals in the vicinity have accumulated chemical contaminants in their tissue. There is a possibility of food chain accumulation in local predators, and fish caught in the Lackawanna River, downstream of the Old Forge mine outfall, have contaminants which may have come from the site.

The effect of the site on the outfall can be determined from a number of facts. First, it is known that the outfall has a flow of thirty to forty million gallons per day and drains the mine pool under the site. Small amounts (less than one pint) of liquid leaking from buried drums and entering the mine pool, assuming even dilution throughout the flow, could exceed part-per-million levels in the discharge. For many organic compounds, this will be in excess of water quality criteria or other limits recommended by Federal and State agencies.

The recommended remedial measures should focus on minimizing further releases of contaminants from the drums buried in Pit 5 and the leachate flows from all the pits. Additionally, the potential for further release of contaminants through erosion of the access road and the borehole pit should be mitigated.

Initial formulation and development of potential alternative actions was based both on generic remedies and possible technologies. Initial screening of technologies was based on: 1) the reliability and effectiveness of the technology in protecting the population and the environment potentially at risk from site contamination, 2) the engineering feasibility of the technology for implementing the proposed remedies at the Lackawanna Refuse site, and 3) costs involved in installing or implementing the technology.

The general response actions reviewed and the potential technologies retained following EPA's screening process are shown in FIG. 11. A detailed discussion of each of these alternatives follows (see also: Summary of Alternatives, Fig. 13).

B. Analysis of Alternatives

PIT 5 REMEDIAL ALTERNATIVES

Alternative 1A - No Action

This alternative involves no remedial action and leaves the site in its existing state. Long-term monitoring and analyses of air, groundwater, and surface water may be implemented, including the installation of a monitoring well system. The site would continue to be a source of contamination. This landfill, in existence for about twelve years, is relatively young. Therefore, it is likely to produce leachate that will, with time, increase in strength. The possibility of the public coming into direct contact with the hazardous substances or leachate would remain, and the risk of toxic gaseous emissions would increase as the substances decompose.

Contamination of nearby surface waters would continue as leachate flows unchecked off-site. The mine pool would continue to act as a "sink" for any contaminated groundwater and would carry the contaminants to the Lackawanna River. Subsidence or natural decay could rupture the buried drums and release their hazardous wastes. Monitoring well data would be unreliable due to the absence of a continuous groundwater flow under the site, and releases would not necessarily be measured. Contamination of the food chain would continue on site and may endanger local predators. No additional protection to the public health or environment would be provided under this alternative. "No-action" has been taken at many hazardous waste sites prior to the implementation of a remedial action and is one reason why these sites continue to endanger the public. There would be no capital costs for this alternative.

Alternative 1B - Capping, Leachate Collection and Treatment On Site, Gas Collection

The purpose of this alternative is to minimize the effect of the contaminants in Pit 5 by reducing risks associated with direct contact and by reducing contaminant migration via the intermittent surface water runoff. A cap would be constructed over the existing wastes to minimize surface water infiltration. Leachate from the waste would be less than the existing amount, provided the cap is properly constructed and maintained.

This alternative involves the construction of a clay cap (see Fig. 12) over the pit. The drums and contaminated garbage would remain in place and be covered by the cap. Diversion ditches and berms would be installed around the perimeter of the capped area to minimize surface water runoff. A leachate collection system to collect residual leachate would be installed downgradient of Pit 5, and any leachate generated would be collected and treated on site. A passive gas venting system would be integrated into the capping system.

The cap would be constructed to meet the requirements of RCRA in that it would be less permeable than the bottom of the pit, and it would be designed with the knowledge that some subsidence (three to seven feet) may still occur in mines beneath the pits. Specific types of clay, moisture content and placement would be determined during the design phase. The small amount of total future subsidence predicted for the site would be accommodated by the design. In addition, quarterly maintenance inspections by the State should identify any subsidence, and repairs would be made to the cap.

Any precipitation that percolates through the topsoil covering the cap would be conveyed through the flow zone (along the top of the clay) and then away from the pit area (see FIG. 12). Leachate collection pipe drains (four inch diameter PVC perforated pipe) would be placed along the downgradient eastern edge of the pit, and leachate that currently emanates as seeps would be collected by these drains. A drainage blanket of gravel or crushed stone would also be placed on top of the waste, but below the clay portion of the cap along the downgradient face of the fill, to facilitate leachate collection.

Leachate treatment would be performed on site with the resulting residual material being removed to a qualifying RCRA facility. Because of the continuous nature of the leachate flows during wet weather and the expected volume, transporting the leachate off-site for treatment was ruled out. Treated effluent would be discharged under State permits to the St. Johns Creek or to the Lower Lackawanna Valley Sewage Treatment Plant. It is anticipated that the quantity of leachate will vary throughout the year and with weather conditions, amounting to 10,000 - 20,000 gallons per day during the highest flow periods. The installation of the cap and surface water diversion system would slow the infiltration of water and subsequent leachate production; it is thus expected that during the five years following construction of the cap, the leachate production will drop substantially as the garbage dries out. Operation and Maintenance would still be needed to observe the flows and treat whatever leachate is produced after this time.

Although methane gas has not yet been detected near Pit 5, it is expected that at some time the decomposing garbage in the landfill will start to produce methane. Therefore, it would be necessary to provide for the venting of this methane gas as well as other landfill gases. A passive collection system composed of gravel channels, perforated pipe, and vent pipes is proposed to permit the normal landfill gases to migrate upward to the air without causing pressure that could damage the cap. The gas venting system would also require monitoring to determine if toxic organic vapors are being released and to determine the need for treatment. Should mine subsidence or consolidation of the landfill material become significant, the reliability of these remedial measures may decrease.

As in Alternative 1A above, groundwater monitoring would not be totally satisfactory, due to the absence of a continuous groundwater system. The cap satisfies applicable criteria concerning design, as can be determined from existing State and Federal policy advisories, and when properly constructed, would meet applicable and relevant performance standards. Permits, other than local construction permits, or an NPDES permit for the leachate discharge would not be required for implementation. Nevertheless, leaving drums containing liquid hazardous wastes and solvents in the pit is inconsistent with those provisions of the Hazardous and Solid Waste Amendments of 1984 that call for minimizing landfill disposal of containerized liquid waste and call for the prohibition of landfill disposal of certain spent solvents. This alternative would take approximately six months to complete, and the capital costs are estimated to be $1,700,000.

Alternative 1C - Partial Excavation, Capping, Incineration of Drums and Contaminated Wastes Off-Site, Leachate Collection and Treatment On-Site, Gas Collection

This alternative includes the installation of a clay cap (as described under Alternative 1B), installation of diversion ditches for surface water runoff, a leachate collection and treatment system, and a passive gas venting system. In addition, there would be "partial" excavation. This excavation would remove all the buried drums and highly contaminated soils and wastes but would leave non-contaminated and low-level contaminated wastes in the pit. Prior to capping the site, all hazardous material that was removed would be transported to an off-site, qualifying RCRA incinerator. This excavation is being termed "partial" because it involves the removal and incineration of all the drums and all the highly contaminated wastes; however, those wastes determined to be equivalent to "normal" municipal refuse would remain in the pit. This would be an effective means of permanently reducing the source of contamination. In combination with a cap, the overall performance of this option is also estimated to be very effective in providing a barrier between the remaining wastes and the environment and in minimizing damage to the public health.

Since this alternative would remove a major portion of the source of hazardous contamination, along with providing the protection of a cap, this would provide a higher degree of reliability in reducing off-site migration of contaminants than Alternative 1B. Subsidence or natural deterioration would not allow the drums to release their contents into the pit.

The partial excavation would remove about 15,000 drums and 4,260 cubic yards of contaminated waste. This data is based on information obtained during the Remedial Investigation phase of the Study. This alternative would remove the hazardous wastes, and therefore, the primary source of contamination from this area, although remaining nonhazardous wastes may continue to generate leachate and gases. Although some wastes contaminated at low levels would remain in place, the quantity is expected to be minimal.

The cap portion of this alternative is easily constructed and thus highly implementable. The partial excavation portion, however, would require the establishment of guidelines to determine the degree of cleanup required. The general approach that would be used to determine "action levels" for excavation of contaminated material at Pit 5 involves: (1) designating background levels of target compounds for the site and, (2) testing Pit 5 material for the extent of contamination relative to background levels. A field screening program is proposed to do most of the required analyses on site as excavation proceeds.

A sampling program would be established to obtain representative samples for analysis that would establish background levels for target compounds. Background levels for "clean" or uncontaminated garbage would be determined from a statistically representative number of samples taken from Pits 2 and 3, which contain "normal" municipal refuse. Background levels for soil contamination would be determined from soil samples taken from non-contaminated areas of the site. The target compounds to be analyzed would be chosen based on compounds expected to be in the drums in Pit 5. Complete analyses of these samples would be performed at a Contract Laboratory Program (CLP) laboratory.

Once the background levels for the compounds are designated, field screening for the extent of contamination of the materials in Pit 5 could begin. Samples for field screening analysis could be obtained from pre-set increments of material being removed from Pit 5. This sampling/removal approach would allow field action decisions to be made quickly and would thus allow cleanup activities to proceed at a steady pace. Material found to be "clean" will be left in or placed back into the pit, while all drums (crushed or full) and all contaminated garbage is removed.

When contamination in the samples from Pit 5 reaches background levels, either of "clean" garbage or soil, removal of materials will cease. At this point samples from the pit boundaries (width and depth) will be taken and analyzed at a CLP laboratory. This complete analysis would determine whether or not removal of contaminants to background levels has been achieved.

As mentioned above, the only waste remaining in the pit would be the municipal waste, which may contain low levels of contamination typical of municipal refuse anywhere. Leachate would still be produced by the remaining municipal waste, but the number and concentration of hazardous constituents would be reduced significantly. The leachate collection and treatment system proposed would eliminate the migration of leachate from the pits across the site and to off-site areas. It would take approximately two years to excavate and sort out the contaminated waste; capital costs are estimated to be $8,200,000.

Alternative 1D - Partial Excavation, Capping, Incineration of Drums Off-Site and Landfill Contaminated Waste Off-Site, Leachate Collection and Treatment OnSite, Gas Collection

This alternative is similar to Alternative 1C with regard to on site remedial actions. The only difference between the two alternatives is that the excavated contaminated bulk liquid wastes would be disposed of in a qualifying RCRA hazardous waste landfill about 300 miles from Old Forge, Pennsylvania, rather than be incinerated. The containerized liquid waste would still be incinerated off-site. This would result in a slightly lower overall cost than Alternative 1C, since the cost of incineration is usually greater than the cost of landfilling. The benefits of this alternative would be the same at the site as those described for Alternative 1C. The approximate time to complete this remedy is two years; capital costs are estimated to be $6,800,000.

Alternative 1E - Total Excavation, Incineration of Drums Off-Site, Off-Site Landfill Disposal of Other Wastes

This alternative represents the most comprehensive clean-up, since all the waste material, hazardous and non-hazardous, would be removed from the site. The drum contents would be incinerated and the remaining bulk liquid would not be required. The excavation would be backfilled with clean, non-leaching material, such as sand and gravel or crushed stone. This alternative would also remove any possibility of direct contact with the waste or leachate and would eliminate potential releases to the air or groundwater. It would take two years to excavate the pit. Because the quantity of waste landfilled is greatly increased for this alternative, the cost of excavation and disposal, estimated at $33 million, would also be much greater than for other alternatives.

PITS 2 and 3 REMEDIAL ALTERNATIVES

Alternative 2A - No Action

This alternative would involve no remedial action and would leave the site in its existing state. The no-action alternative for Pits 2 and 3 would involve only the implementation of a long-term monitoring program. This program would include monitoring of the air, surface water, and groundwater in the vicinity of the pits. The monitoring should include sampling and testing of the air, water and stream sediments for the presence of pollutants known to exist at the site, but would involve the same problems described under 1A.

Experience with this alternative at other hazardous waste sites has demonstrated that these pits would continue to be a source of serious health problems from direct contact with the waste, surface water contamination, and possible groundwater contamination. Without a cap, infiltration would continue to produce leachate that would eventually convey pollutants into nearby streams and watercourses. In its existing condition, the material in Pits 2 and 3 is relatively accessible to the general public, and thus direct contact with the waste or leachate is a concern. There would be no capital costs.

Alternative 2B - Capping, Leachate Collection and Treatment On Site, Gas Collection

This alternative includes construction of a clay cap (See Fig. 12) over the contents of Pits 2 and 3, collection of the surface leachate, treatment of the leachate on site, and collection of and venting gas emanating from the landfill. The risk to public health and the environment would be minimized due to control of the migration of pollutants into the air, the ground, and the groundwater.

Based on a review of the existing site conditions and the characteristics of the landfilled wastes, this alternative can be considered an effective method to control the migration of pollutants in the air, into the ground, and in the groundwater.

The clay cap, which would be continuous with the cap constructed over Pit 5 (assuming a cap alternative is chosen for Pit 5), would reduce the amount of leachate, which is caused by infiltration of rainwater through the landfill wastes. Lateral upgradient infiltration is not expected to be a concern because of the low permeability of the soils in this area of the site. Infiltration that passes through the two feet of soil would be intercepted by the drainage layer and diverted from the landfill. Since the quantity of infiltration would be reduced, groundwater contamination should also decrease as the landfill stops serving as a source of migrating pollutants. The only amount of leachate that would be generated after capping would result from residual moisture in the waste and cap material and from the minimal infiltration after cap installation. The cap would also serve as a barrier between the wastes and the public, and thereby decrease the risk of direct contact.

A passive gas collection system containing gravel channels, perforated pipe, and vent pipes is proposed. Four-inch diameter PVC perforated pipe will be installed as laterals under the cap to collect the landfill gases. This venting and collecting system would be installed within the upper layers of the wastes and vented through the cap. Although methane is not currently being detected, at some time, the landfill wastes will start to produce methane. Therefore, it would be necessary to provide for the venting of the methane as well as other landfill gases.

Leachate generation would be controlled by the proposed leachate collection system which would inhibit the leachate from flowing through existing erosion gullies, ditches, and various seeps and thus from entering surface waters. Currently, the largest quantities of leachate are generated from: (1) the seeps below Pit 3, (2) the sluice pipe seep, and (3) the base of the spoil pile seep.

The discharge from each seep is directly related to previous rainfall. Therefore, if the installation of a cap can reduce the infiltration, the discharge from the seeps should also decrease. Surface waters would be cleaner and would also decrease the possibility of public contact with the leachate. It would take approximately six months to implement this alternative and capital costs are estimated to be $4,138,000.

Alternative 2B - Capping, Leachate Collection and Treatment On Site, Gas Collection

This alternative includes construction of a clay cap (See Fig. 12) over the contents of Pits 2 and 3, collection of the surface leachate, treatment of the leachate on site, and collection of and venting gas emanating from the landfill. The risk to public health and the environment would be minimized due to control of the migration of pollutants into the air, the ground, and the groundwater.

Based on a review of the existing site conditions and the characteristics of the landfilled wastes, this alternative can be considered an effective method to control the migration of pollutants in the air, into the ground, and in the groundwater.

The clay cap, which would be continuous with the cap constructed over Pit 5 (assuming a cap alternative is chosen for Pit 5), would reduce the amount of leachate, which is caused by infiltration of rainwater through the landfill wastes. Lateral upgradient infiltration is not expected to be a concern because of the low permeability of the soils in this area of the site. Infiltration that passes through the two feet of soil would be intercepted by the drainage layer and diverted from the landfill. Since the quantity of infiltration would be reduced, groundwater contamination should also decrease as the landfill stops serving as a source of migrating pollutants. The only amount of leachate that would be generated after capping would result from residual moisture in the waste and cap material and from the minimal infiltration after cap installation. The cap would also serve as a barrier between the wastes and the public, and thereby decrease the risk of direct contact.

A passive gas collection system containing gravel channels, perforated pipe, and vent pipes is proposed. Four-inch diameter PVC perforated pipe will be installed as laterals under the cap to collect the landfill gases. This venting and collecting system would be installed within the upper layers of the wastes and vented through the cap. Although methane is not currently being detected, at some time, the landfill wastes will start to produce methane. Therefore, it would be necessary to provide for the venting of the methane as well as other landfill gases.

Leachate generation would be controlled by the proposed leachate collection system which would inhibit the leachate from flowing through existing erosion gullies, ditches, and various seeps and thus from entering surface waters. Currently, the largest quantities of leachate are generated from: (1) the seeps below Pit 3, (2) the sluice pipe seep, and (3) the base of the spoil pile seep.

The discharge from each seep is directly related to previous rainfall. Therefore, if the installation of a cap can reduce the infiltration, the discharge from the seeps should also decrease. Surface waters would be cleaner and would also decrease the possibility of public contact with the leachate. It would take approximately six months to implement this alternative and capital costs are estimated to be $4,138,000.

Alternative 2C - Total Excavation, Disposal Off Site

This alternative would require the complete removal of all wastes and contaminated soils contained within Pits 2 and 3 and the backfilling of the excavated area with an equal amount of clean soil or rock. The baseline estimate for volume of excavation is 420,000 cubic yards. All wastes are regarded as hazardous for the purpose of this evaluation and would be transported and disposed of off-site at a qualifying RCRA facility. No long-term monitoring would be required for total excavation, nor would leachate or gas collection be required, since the source of both would be removed.

Total excavation of contaminated waste is the most effective but also the most expensive of the remedial alternatives. Since this area of the site is the largest and contains the greatest volume of wastes, it may be inferred that it will produce the greatest volume of contaminants subject to migration. This contamination, however, may not be as toxic as that from Pit 5, which contains the drums of hazardous substances.

This alternative would eliminate direct contact with the waste and with the leachate seeps. It would take approximately two to three years to excavate the pits, and capital costs are estimated to be $78,942,000.

BOREHOLE PIT REMEDIAL ALTERNATIVES

Alternative 3A - No Action

The no-action alternative for this area would not involve monitoring, analyses, nor soil removal activities; the site would remain in its existing state. This alternative would not prevent or minimize risk to the public health and to the environment, but this risk applies only to those few who may come into direct contact with the exposed wastes and only to a very limited degree. This alternative, therefore, could be used because the relatively isolated location of this pit and the potential for limited contamination would keep the degree of risk to the public very low.

Alternative 3B - Capping

This alternative includes the construction of a clay cap over the borehole pit. Surface water flow over the cap would be diverted by diversion ditches and/or berms placed along the upslope perimeter of the area. The cap would reduce, but not eliminate, infiltration of the waste material. Slight infiltration is acceptable, however, since the potential for contaminant migration is relatively low even without a cap. This option would significantly reduce any threats to the environment or public health that currently exist. As a source control option, capping would minimize potential off-site releases of contaminants and would prevent direct contact with the wastes. It would take approximately three months to implement this alternative, and the capital costs are estimated to be $234,000.

Alternative 3C - Excavation, Disposal Off-Site

This alternative includes the removal of approximately 1,500 cubic yards of contaminated soil in the borehole pit to a depth of about one foot and the disposal of this material in a qualifying RCRA facility.

Because the migration of metals in soils is slow, it is believed that the contamination is in this top layer of soil. Sampling during excavation would be used to insure reaching "clean" soil at background levels. It would take approximately four weeks to implement this alternative, and the capital costs are estimated to be $283,000.

ACCESS ROAD REMEDIAL ALTERNATIVES

Alternative 4A - No Action

This option would maintain the access road in its existing condition and would not provide for environmental monitoring of surface or subsurface hazardous substances.

Because the hazardous wastes were disposed on the surface of the road, erosion and subsequent surface transport are primary concerns. Although no off-site contamination has been discovered that can be directly attributed to the access road, continued erosion is likely, and the contaminants on the road would also be carried off-site into the St. Johns Creek. Therefore, this alternative does not alleviate the existing threat of the spread of contamination to the public and the environment.

Alternative 4B - Excavation and Disposal Off-Site

This alternative would involve excavating the top twelve inches of existing road material (consisting of dirt, gravel and mine spoil), installing sediment traps and culverts, and reconstructing a new roadway surface along the 1,500 feet of the access road. The excavated material, approximately 1,650 cubic yards, would be transported and disposed of at a qualifying RCRA facility. Post-action monitoring along the access road is not recommended, since excavation and off-site disposal of the excavated material would provide a permanent remedial action (as long as the contaminated water is kept off the roadway and the roadway is continuously maintained). This option would reduce the possibility of future migration of contaminants by removing the contaminated material. Although it is believed that most of the contamination is in the top layer of soil, analysis during excavation of deeper soils would allow excavation to "background" to be determined. Construction related to implementation of this alternative would require about three weeks to complete, and the benefits would be immediate. Capital costs are estimated to be $284,000.

Alternative 4C - Excavation, Disposal On Site

This alternative would involve the same remedial actions discussed under Alternative 4B. This alternative differs in that the excavated roadway material would be placed on top of the existing waste in Pits 2, 3, and 5. This would be a technically feasible alternative, since the roadway is coarse, aggregate material produced from the strip mining. This material is not considered to be highly contaminated, and its disposal on the existing landfill would therefore not significantly increase the threat to the public health and environment. However, the amount of material to be excavated will exceed the small quantity exclusion under RCRA (1000 kg); this would preclude the disposal of the excavated material on-site. It would take approximately three months to implement this alternative, and capital costs are estimated to be $34,000.

PAINT SPILL REMEDIAL ALTERNATIVES

Alternative 5A - No Action

The no-action alternative would not reduce the risk to public health, because the contaminated material would remain in place. If the material is left in place, it could be inadvertently excavated and used as backfill without knowledge of the soil contaminants. This has occurred at other sites and could also happen at this site. There would be no capital costs.

Alternative 5B - Excavation, Disposal Off-Site

Excavating the contaminated ground would be a highly effective method of removing the spill. This is especially so since the paint waste is clearly distinguishable and located within the top one foot of the ground. An excavation of ten cubic yards would remove the paint from the soil and would be backfilled to original grade.

Once the paint waste is excavated and the excavation backfilled, the potential for this material being inadvertently taken by someone and used would be eliminated. The estimated time to implement this alternative is one week, and the capital costs are estimated to be $2,000.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

Alternatives were examined in light of relevant Federal, State and local environmental program requirements for actions such as disturbances of contaminated soils, and in light of all RCRA and CERCLA requirements for the closure of hazardous waste landfills and for disposal of excavated contaminants in off-site hazardous waste facilities, including landfills and incinerators.

The remedial actions proposed will be coordinated with the State to insure that any discharge of treated leachate will meet all permit requirements and that water and air quality will meet all applicable standards.

RECOMMENDED ACTION

Section 300.68(j) of the National Contingency Plan (NCP) states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e., the lowest cost alternative that is technologically feasible and reliable) and which effectively mitigates and minimizes damage to, and provides adequate protection of public health, welfare, or the environment. Based on our evaluation of the cost-effectiveness of each of the proposed alternatives, of the comments received from the public, and of information received from the Pennsylvania Department of Environmental Resources, we recommend:

Pit 5:

Alternative 1C - Excavate all drums in the pit, along with all contaminated garbage surrounding them. Uncontaminated waste will remain in the pit. Excavated material would be incinerated if adequate capacity is available at that time. If not, all liquids would be incinerated, but the solid waste would be disposed of at a qualifying RCRA landfill in compliance with EPA's current off-site disposal policy. The pit would then be capped and a leachate collection and treatment system installed in conjunction with the system at Pits 2 and 3.

The capping and leachate collection system would be necessary, since the refuse remaining in place will leach hazardous substances contained in the normal municipal waste disposed of in the pits. These contaminants are found in the existing leachate and must be controlled. The cap and collection system would control the flow of this leachate and eliminate its migration off-site.

Pits 2 and 3:

Alternative 2B - Construct a clay cap over the pits and install a leachate collection and treatment system on site. This cap and leachate system would be continuous with the cap and leachate system constructed for Pit 5. The treated leachate effluent flow would be via a permitted discharge into the St. John's Creek or to a local sewage treatment system capable of handling the flow.

Borehole Pit:

Alternative 3B - Excavate approximately the top one foot of contaminated soil for disposal off-site at a qualifying RCRA facility. The actual depth of excavation needed would be determined by sampling the soil at intervals until background levels of contaminants are reached. Due to the very low levels of contamination found in the Remedial Investigation, samples and the known low migration of metals through soil, it is estimated that one foot would be sufficient.

In addition, to regrade the site and to further minimize contact with the subsoils, a soil cover would be placed on the pit to a depth of approximately two feet. This recommended alternative reflects comments received during public review and therefore does not exactly reflect any one alternative discussed above (from the Feasibility Study).

The excavated material containing hazardous substances would be transported off-site to a qualifying RCRA facility. Disposal in the pits on-site was ruled out because the purpose of the remedial action is to remove hazardous waste from the pits, leaving only municipal refuse.

Access Road:

Alternative 4B - The top six to twelve inches of the access road would be removed and disposed of off-site at a qualifying RCRA facility. The road would then be regraded, drainage improved and a new soil and gravel surface would be placed on top of the road. Disposal in the pits on-site was ruled out, because the purpose of the remedial action is to remove all hazardous waste from the pits, leaving only municipal refuse.

Paint Spill:

Alternative 5B - The paint spill area would be excavated and disposed of off-site in a qualifying RCRA facility. Disposal in the pits on-site of this RCRA hazardous waste was ruled out for the reasons given above for the borehole pit and access road wastes.

In sum, EPA's recommended action includes those alternatives that require excavation and off-site disposal of all drums and highly contaminated fill material and wastes to a qualifying RCRA facility. These alternatives were selected based on their reliability in eliminating the continued generation and off-site migration of leachate from Pits 2 and 3 and the continued contamination of the groundwater and mine pool beneath the site. On-site disposal of the hazardous wastes was ruled out, because the borings and hydrogeologic data indicate that the rock below the site is fractured and contains numerous pathways for the contaminants and groundwater to mix. Moreover, the absence of a continuous groundwater system would make subsequent monitoring (a RCRA requirement) impossible, and the predicted amount of subsidence (three to seven feet) can be accommodated by a properly constructed clay cap.

To define excavation limits, background soil levels of inorganics would be obtained from borings in "clean areas" away from the pits. This data would be used to assess soil concentration background levels in the borehole and access road areas. In Pit 5 organic contaminant levels would be established by using background concentrations determined from a statistical sampling from Pits 2 and 3, which contain typical municipal refuse of approximately the same age as that in Pit 5. An ongoing contamination detection program will be conducted during excavation to separate clean material from contaminated waste.

Excavation of Pit 5 is expected to progress slowly (it will take at least a year and a half) due to the need for frequent monitoring and sampling. Continuous monitoring will be performed around the excavation to detect any organic vapors being released by the excavation. Clean soil or cover will be readily available and could be rapidly placed by a bulldozer over any material releasing harmful vapors. The selection of the hazardous

material to be excavated will be accomplished by a large-scale "sifting" through the landfill waste. Only a small section of the pit would be open at any one time, and it is expected that excavation and removal of contaminated material will progress from one end of the pit to the other with the excavated and "cleaned" area being closed as the next area to be worked is opened.

To avoid creating a depression which would accumulate water and accelerate the natural flushing of the waste, the excavated pits would be backfilled and graded to prevent surface run-on and direct run-off. Site reclamation after removal will include grading, capping and revegetation. The fence and gates installed during the removal action will remain and any repair necessary will be made.

Prior to commencing excavation, the following measures will be implemented:

- Decontamination and improvement of the access road to the site to accommodate heavy equipment and truck traffic. This is also the chosen remedial alternative for the access road.

- Formulation of an air monitoring plan and temporary evacuation plan for protection of local residents. This will be similar to the measures taken during the previous test pit excavations at the site.

Transport and off-site disposal of all hazardous wastes will be conducted in accordance with RCRA and Department of Transportation regulations. Off-site incineration of excavated materials is the preferred method of destroying hazardous substances, according to CERCLA Guidance. Should incineration capacity be limited during the excavation period, however, only the containerized liquid wastes would be sent to an incinerator. The remainder of the hazardous wastes would go to a qualifying RCRA landfill.

Leachate Contaminated Soils

Small areas of soil along the bases of the pits and outside the existing fence have been contaminated by leachate. Comments received during the public review period asked that we address this problem. We plan to sample these areas and excavate the contaminated soil down to background level. Regrading to original contours would be made with clean topsoil, and the area would be revegetated.

St. John's Creek

The contaminants in the water of the Creek (see FIG. 9) should be eliminated by the recommended remedial action. Leachate flow to the stream would cease, and the low-level organic contaminants would no longer be present. The low levels of organic contaminants in the stream sediments are not a concern and, in fact, decrease downstream of the site.

Lackawanna River

Fish caught in the River showed organic contaminants in their tissue. These contaminants (pesticides and PCB's) were not directly attributable to the site and most likely were from sources near the river. The recommended remedial action at the Lackawanna site would eliminate any possible further contribution of contaminants to the River from the site. The U.S. Fish and Wildlife Service and the Pennsylvania Fish Commission will be given collected data to determine what actions, if any, should be taken in the Lackawanna River.

OPERATION AND MAINTENANCE

Post excavation activities will include the continued collection and treatment of residual leachate and contaminted shallow groundwater. It is expected that by removing the source of contamination the quality of leachate and contaminated groundwater will gradually improve so that operation of the treatment system will no longer be warranted. This time period is estimated to be five years, according to the following schedule:

SCHEDULE

Approve Remedial Action (Sign ROD)	3/31/85
Amend Cooperative Agreement with COE for Design	3/31/85
Start Design	June 1985
Complete Design	March 1986
Amend Interagency Agreement for Construction	March 1986
Start Construction	June 1986
Complete Construction	September 1988

EVALUATION OF ALTERNATIVES NOT SELECTED

Pit 5:

Alternative 1B, which allows capping, leachate collection and treatment, and passive gas collection was not chosen due to the inability of this alternative to remedy the continuing contamination of the groundwater and the potential for further releases. Therefore, this alternative does not adequately mitigate or minimize damage to public health and the environment. It is known that the pit contains drums of liquid wastes which are flammable and reactive. These drums are leaking and are mixed in with other wastes. Additionally, the site has been undermined and may be subject to subsidence. As the drums deteriorate or subsidence occurs, it is likely that more drums will be damaged and their contents released. This alternative also fails to provide any monitoring for this kind of occurrence, since the contaminants may flow directly into the mine pool. Additionally, the contents of the drums could be released as toxic gases, and it is unlikely that periodic monitoring would be able to identify a sudden release of the gas in sufficient time to prevent harm to local residents.

Additionally, any releases would most likely require corrective action. It would be difficult to define a plume of contamination under emergency circumstances and impossible to try to control it without excavating the leaking drums. This is what was already proposed in Alternatives 1C-E. Lastly, RCRA requirements under 40 C.F.R § 264 prohibit storage of ignitable wastes under conditions existing in Pit 5 for the reasons listed above.

Alternative 1E, total excavation, was not chosen due to its prohibitive expense ($33,500,000) and lack of clear advantages over "partial" excavation, which is estimated to cost $8,200,000. Removal of all the contaminated garbage and drums in Pit 5 under the recommended alternative will still substantially reduce the risk of further releases; should any mine subsidence occur, there will be no drums to rupture and release their contents into the mine pool or into the air. The remaining waste is essentially typical municipal waste and need not be excavated.

Pits 2 and 3:

Excavation of these pits was not chosen, since these pits do not contain a large number of drums, as does Pit 5. Although these pits contain mostly municipal refuse, it is possible that there are random drums of industrial waste through the pits. Contaminants occur in the leachate from these pits, but the selected alternative should address this problem. Thus, there is no valid technical reason to excavate material from these pits.

Borehole Pit:

While capping this pit, which has low levels of contamination, would prevent direct contact with the material, there is still a potential for further migration of the contaminents into the groundwater and mine pool beneath the site. Excavation of the more highly contaminated top soil will minimize this risk, however. Disposal of the hazardous soil into one of the on-site pits was not chosen, since the purpose of our remedial action is to remove hazardous materials off-site and to leave only municipal-type refuse. The quantity of contaminated soil also exceeds the small quantity (less than 1000 kg) exclusion of RCRA; this precludes disposal of the excavated material in Pits 2, 3 or 5.

Access Road:

Disposal of excavated material into the pits on-site was not chosen, since it is the purpose of the remedial action to remove hazardous wastes from the pits and to leave only municipal-type refuse. As with the borehole pit, the quantities of contaminated soil will exceed the small quantity exclusion of RCRA and must be transported off-site.

Paint Spill:

Disposal of the excavated material into the pits on-site was not chosen for the same reasons as given above for the access road. The paint spill is a RCRA-defined hazardous waste and the quantity expected to be excavated will exceed the small quantity exclusion of RCRA. This is another reason why the waste cannot be placed in Pits 2, 3 or 5.

SUMMARY EVALUATION OF RECOMMENDED ACTION:

The chosen alternatives meet the major objectives of mitigating and/or eliminating environmental contamination at the site. Removal of the drums in Pit 5 provides the greatest benefit. Although capping the pit without excavation would reduce some threats of direct contact and reduce leachate at a capital cost of $1,700,000, the drums would still be there. Mine subsidence and drum degradation could lead to large releases of hazardous waste under the cap. Gases or reaction products could be released through the gas venting system to the air. Liquid hazardous wastes could enter the mine pool and be transmitted to the Lackawanna River. In addition, RCRA requirements would preclude leaving the hazardous liquids on site in the pits. The drummed wastes are reactive and are mixed with other substances. It is also impossible to monitor the groundwater beneath the pit, since there is no continuous groundwater system. Contaminants would leave the drums and could not be monitored by a well. The removal of the drums and the contaminated garbage around them at a capital cost of $8,200,000 is therefore the most efficient and effective alternative.

Under the recommended remedial action, the wastes remaining will be equivalent to typical municipal waste, and under RCRA closure requirements, a cap and leachate collection system must be installed at municipal landfills. The proposed remedial action complies with this requirement. Pits 2 and 3 will have a clay cap continuous with the cap on Pit 5 and also an integrated leachate collection system. These remedies will eliminate the migration of contaminated leachate from the pits. The pits may still contain random containers of hazardous waste (as are found in any municipal landfill), but the benefit in removing these small quantities of hazardous waste would not be nearly as great as that in removing the drums from Pit 5. The cap and leachate collection system should adequately prevent the contaminants from leaving the site.

The borehole pit, access road and paint spill areas, along with the leachate-contaminated soils, will be remedied by removal of the contaminated soil and off-site disposal in a qualifying RCRA facility.

ENFORCEMENT HISTORY

EPA negotiated a consent order and plea agreement in April 1983 with the operator of the site. A provision of these agreements provides that the site owner will sell the property, and the proceeds wil be deposited in the Superfund Trust Fund. As of this date, the sale has not taken place.

Information regarding potentially responsible parties (PRPs) at this site is incomplete. In May and June 1984, an EPA contractor conducted a PRP search using site-related records and interviews. EPA sent twenty-eight information request letters. Although we have received responses to most of these, the responses were often inadequate.

In March 1985, notice letters will be sent to twenty PRPs (including the property owner, the operator, generators and transporters) giving them the opportunity to undertake or assist in the chosen remedial alternative. These letters will also request further information from those PRPs who responded inadequately to the initial information request letters. Negotiations with PRPs interested in undertaking the remedial action will be conducted during the design phase. Agreements will be in the form of CERCLA "§ 106" consent orders. In the event that agreement with the PRPs is not reached, it is recommended that the Agency proceed with Fund-financed remedial action. Unilateral orders will not be issued because of: potential long-term delays in construction if the orders are appealed (as in the McCall case); the large number of PRPs; questions regarding the strength of evidence against PRPs; and, questions regarding the financial status of PRPs. Upon completion of the remedial action, EPA will pursue cost recovery actions, as appropriate.

During the remedial action, we will continue the PRP search. We are considering requesting information from a new listing of possible generators which was developed based on a search of file information conducted by EPA. We will issue notice letters to any additional PRPs which are identified during this period.

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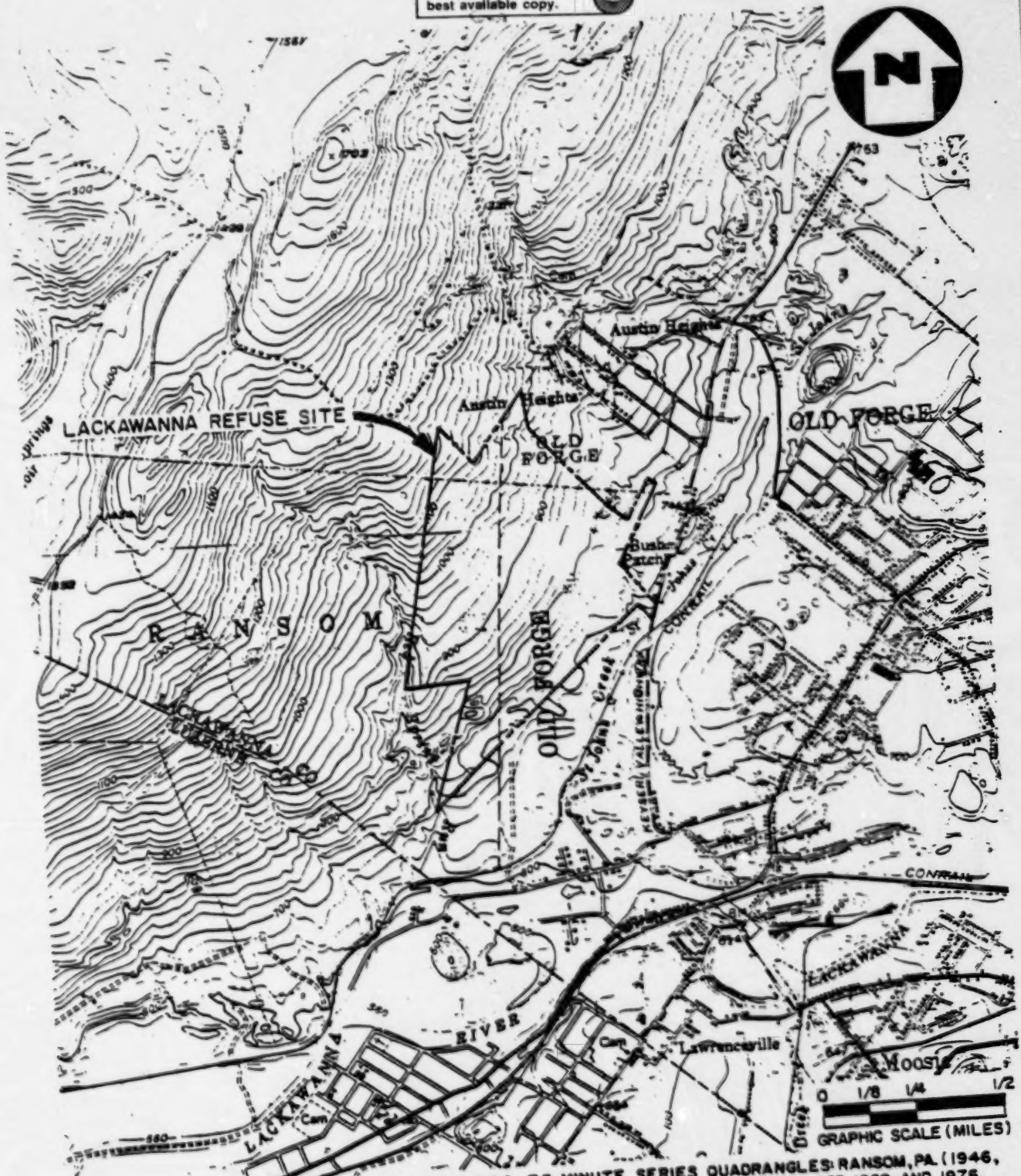


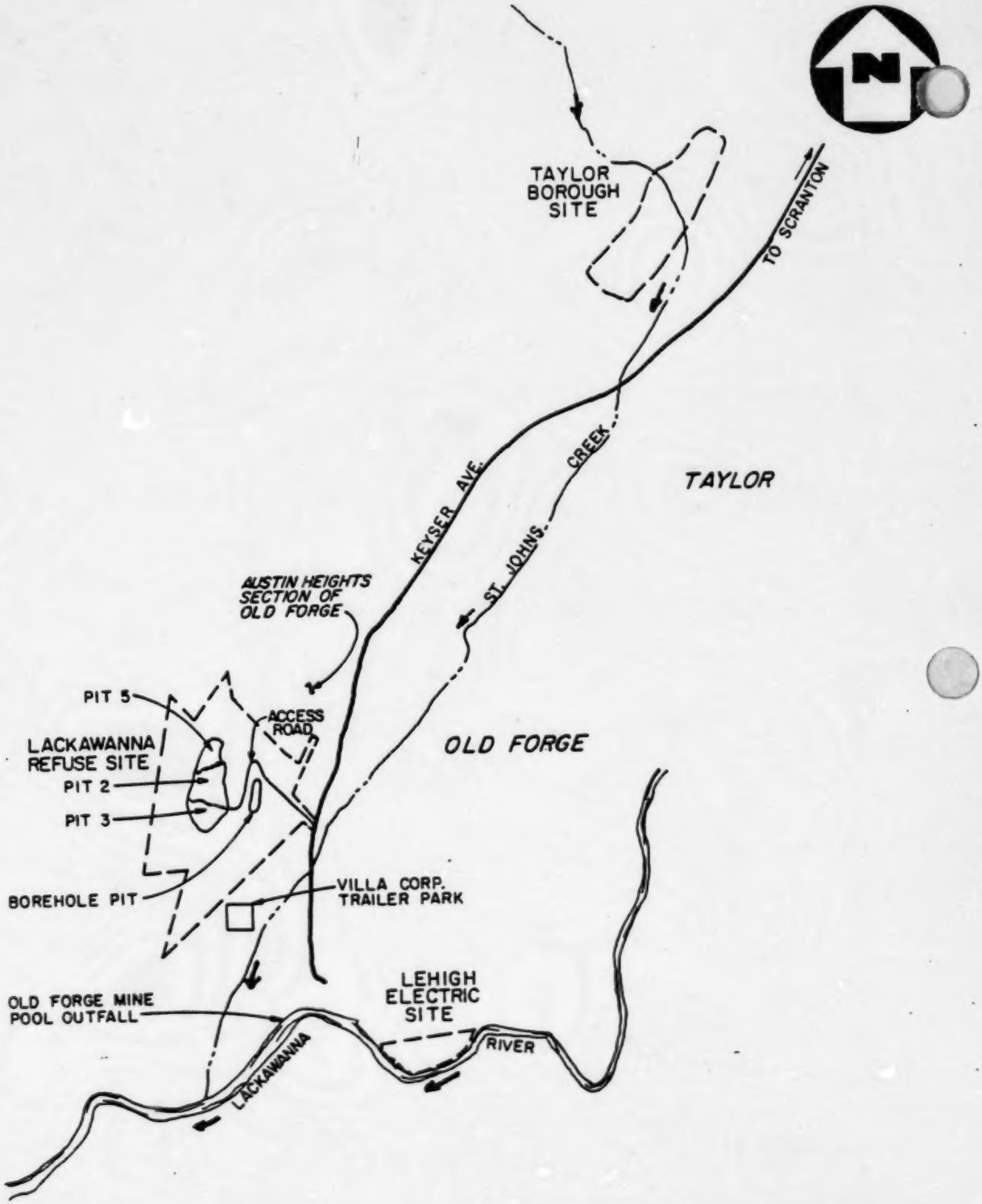
BASE MAP IS A PORTION OF THE FOLLOWING U.S.G.S. 7.5 MINUTE SERIES QUADRANGLES: RANSOM, PA. (1946, PHOTOREVISED 1969 AND 1976, CONTOUR INTERVAL 20'), SCRANTON, PA. (1947, PHOTOREVISED 1969 AND 1976, CONTOUR INTERVAL 20'), PITTSTON, PA. (1947, PHOTOREVISED 1969 AND 1976, CONTOUR INTERVAL 20'), AVOCA, PA. (1946, PHOTOREVISED 1969 AND 1976, CONTOUR INTERVAL 20').

LOCATION MAP
LACKAWANNA REFUSE SITE, OLD FORGE, PA

SCALE: 1" = 2000'

NUS CORPORATION
A Halliburton Company

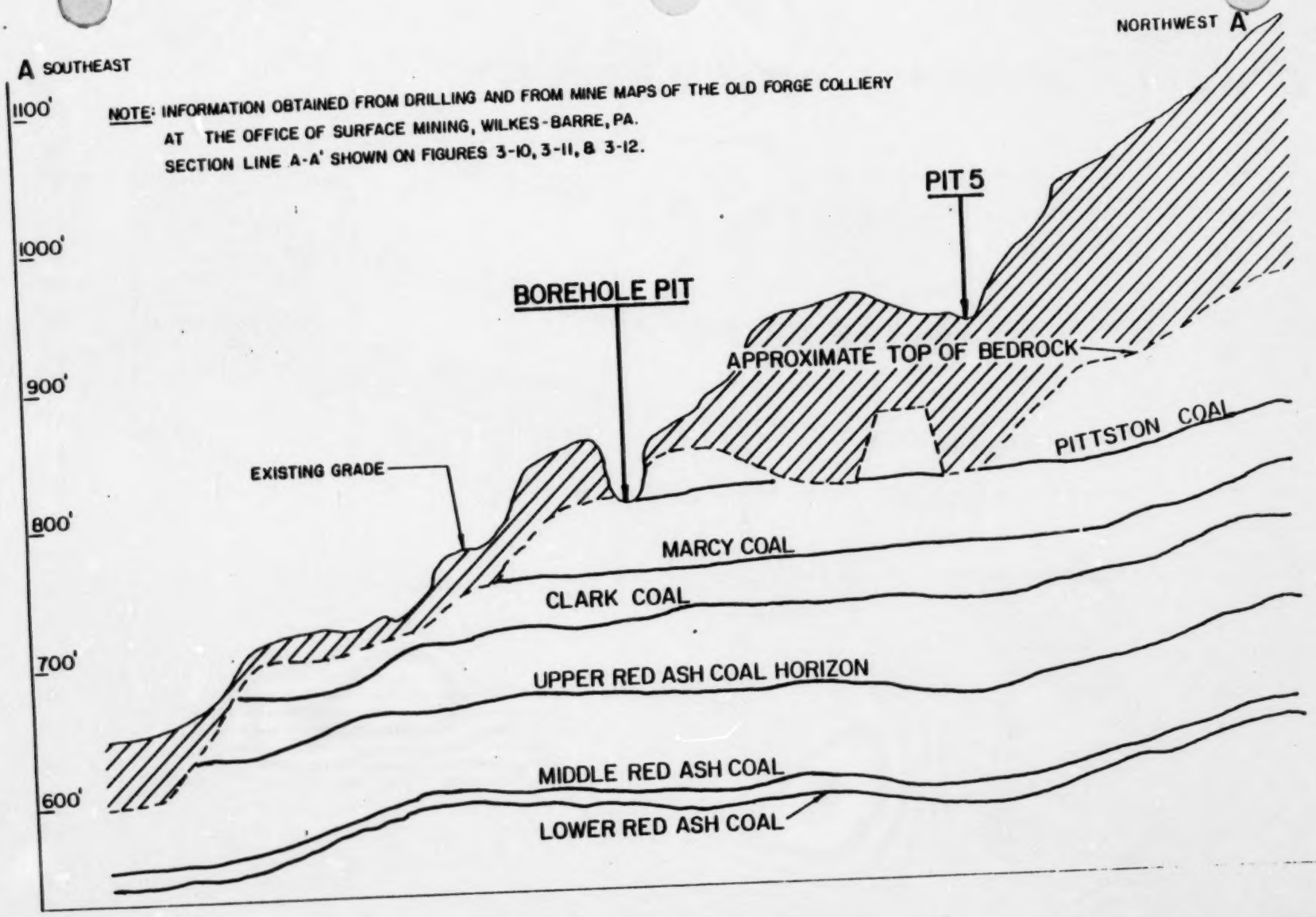
FIGURE 1



SUPERFUND SITE LOCATION MAP
LACKAWANNA REFUSE SITE, OLD FORGE, PA
SCALE: 1" = 3000'

NUS CORPORATION
A Halliburton Company

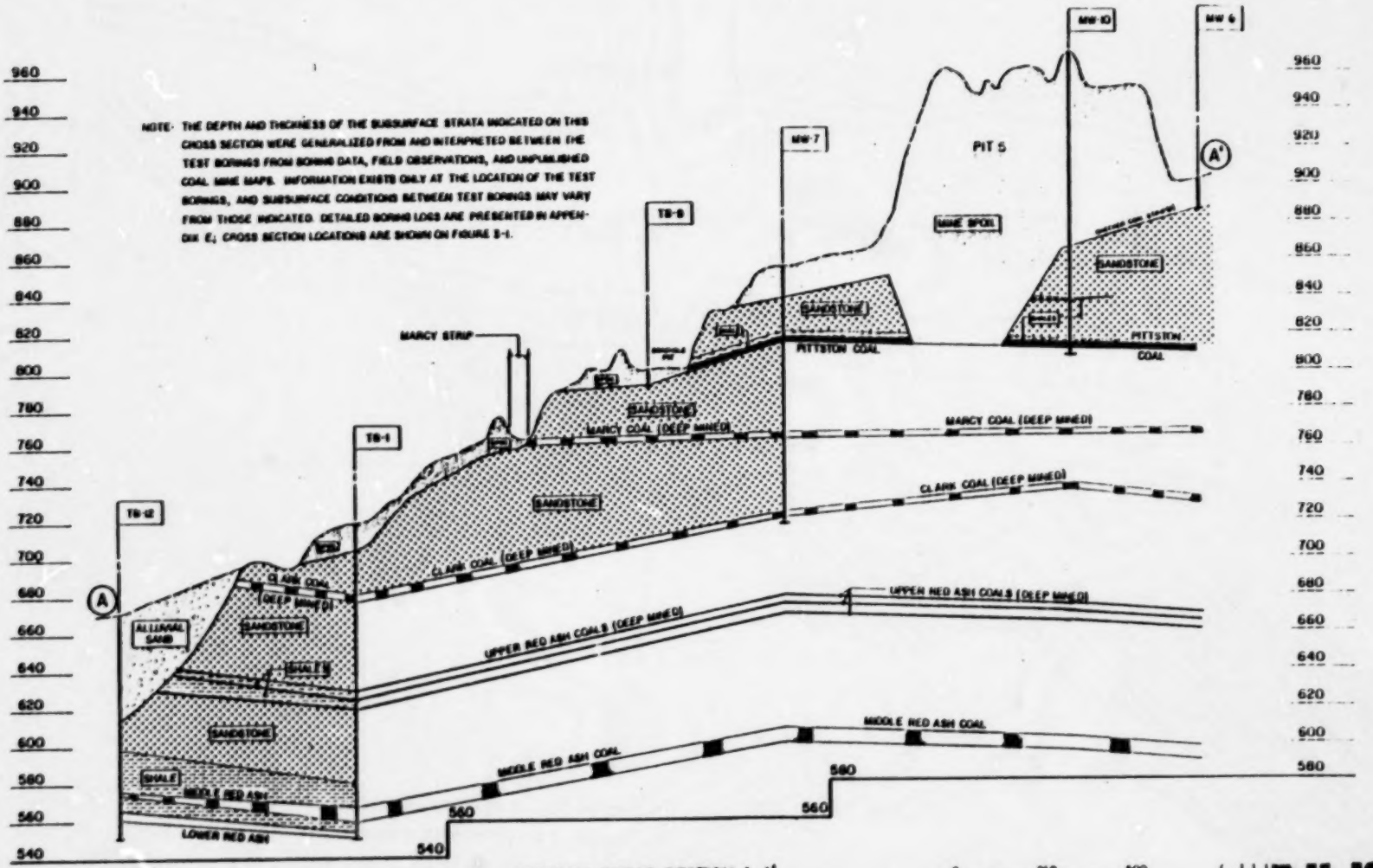
FIGURE 2



GENERALIZED CROSS SECTION
LACKAWANNA REFUSE SITE, OLD FORGE, PA
SCALE: 1"=450' HORIZ., 1"=100' VERT.

NUS CORPORATION
A Halliburton Company

FIGURE 3



GEOLOGIC CROSS SECTION A-A'
LACKAWANNA REFUSE SITE, OLD FORGE, PA
SCALE: 1"=250' HORIZ., 1"=50' VERT.

NUS CORPORATION
A Halliburton Company

FIGURE 4

DOMESTIC WELLS - METALS AND ORGANICS (µg/l)
LACKAWANNA REFUSE SITE
SEPTEMBER 1983

Parameter	Domestic Wells Concentration Range
Aluminum	<200 - 2000
Antimony	<20
Arsenic	<10
Barium	<100 - 200
Beryllium	<5
Boron	<100
Cadmium	<1 - 4
Chromium	<10
Cobalt	<50
Copper	<50
Iron	<50 - 500
Lead	<5 - 25
Manganese	195 - 2300
Mercury	<0.2
Nickel	<40
Selenium	<2
Silver	<10
Thallium	<10
Tin	ND
Vanadium	<200
Zinc	ND - 480 CF
Acetone	ND - 25
Chloroform	ND
Dieldrin	ND - 209
Methylene Chloride	ND

µg/l : micrograms per liter (ppb)
ND : not detected, not detected due to lab blank, or not detected due to field blank
CF : corrected for field blank
< : less than
Samples collected by NUS Corporation.
Table compiled from data in Tables D-1 and D-2.

FIGURE 5

SUMMARY OF CONTAMINANTS

WELLS	UPGRADIENT	MW # 4	OTHER WELLS
INORGANICS concentrations in mg/l (parts per million)			
Ammonia	<100 - 900	76,000 - 170,000	<100 - 800
Boron	<100	3232	<100
Magnesium	3,800 - 30,100	425,000	2,400 - 209,000
Manganese	75 - 1291	22,310 - 47,500	<10 - 7830
Nickel	<40	46 - 80	<40 - 101
Zinc	<10 - 36	10 - 60	<10 - 260
ORGANICS concentrations in ug/l (parts per billion)			
Ammonia	ND - <190	11,000 - 15,000	ND
2-Butanone	ND	26,000 - 29,000	ND
1,2-Dichloroethane	ND	ND - 1500	ND
Methylene Chloride	ND - 65,000Q	<500 - 1440	ND - 87
2 Methyl-2-pentanone	ND	5,400 - 5,600	ND
2 Methylphenol	ND	ND - <6,600	ND
Toluene	ND - <46	1,200 - 1,500	ND

ND: Not Detected

Q: Questionable Data

Figure 6

SUMMARY OF CONTAMINANTS

PIT 5	Leachate and surface water	Other Seeps	Surface water
INORGANICS	concentrations in mg/kg (parts per million)		
Iron	159 - 43,600	410 - 92,000	134 - 14,540
Magnesium	2,100 - 9,800	9,700 - 255,000	8,100 - 76,400
Nickel	<25 - 50	<40 - 120	<40 - 163
ORGANICS	Concentrations in ug/kg (parts per billion)		
Ammonia	230	160,000 - 220,000	760 - 9,600
Acetone	ND - <570	ND - 880	ND - 1990
Benzoic Acid	ND - 400	ND - 1,400	ND - 510
2-Butanone	ND - 2,400	ND - 1,300	ND - 2,800
1,1-Dichloroethane	ND - 8.2	ND - 33.1	ND
1,2-Dichloroethane	ND - 5.8	ND - 1.3	ND
Diethyl phthalate	ND - 87.5	ND - 27	ND
Isophorone	ND - 230	ND - 36	ND - <33
4-Methylphenol	ND - 520	ND - 510	ND - 20
Toluene	ND - 120	ND - 151	ND - <75
Xylenes	ND - 180	ND - 180	ND

ND: Not detected

SUMMARY OF CONTAMINANTS

	ACCESS ROAD	BOREHOLE PIT	Typical Coal or Soil Range
INORGANICS concentrations in mg/kg (parts per million)			
Cadmium	<0.05 - 1.2	<0.05 - 1.2	0.01 - 0.7
Copper	6.0 - 32.5	3.85 - 1650	2 - 100
Manganese	97.5 - 13,100	190 - 345	11 - 850
Nickel	4 - < 20	4.3 - 324	7 - 40
Tin	<1	<1 - 53	1 - 8
Zinc	10.5 - 435	17 - 640	11 - 50
ORGANICS concentrations in ug/kg (parts-per-billion)			
Tetrachloroethylene	ND	ND - <2.5	ND - <5
Toluene	ND - 5.1	ND - 3.5	
Bis(2-ethylhexyl)-phthalate	ND - 1,600	ND	ND
Di-n-octylphthalate	<10 - 1,500	ND	ND

ND: not detected

FIGURE 8

SUMMARY OF CONTAMINANTS

	STREAMS FLOWING OFF-SITE	ST. JOHNS CR. ABOVE SITE	ST. JOHNS CR. BELOW SITE	OLD FORGE OUTFALL
INORGANICS concentrations in mg/kg (parts per million)				
Manganese	71 -1,200	38	242 - 306	3,800 - 4740
Zinc	13 -59	27	20 - 33	<10 - 20
ORGANICS concentrations in ug/l (parts per billion)				
Acetone	ND - 79.1	ND	18.9 - 19.7	ND
2-Butanone	ND - 245	ND	46.8 - 88.4	ND
2-Hexanone	ND - 11.5	ND	ND	ND
Methylene Chloride	ND - 39.5	ND - 15	ND - 68	ND-770Q
4-methyl-2-pentanone	ND - 54.6	ND	4.5 - 16.1	ND
Bis (2-ethylhexyl)-phthalate	ND	ND	ND - 548	ND
4-Methylphenol	ND - 233	ND	ND	ND
Phenol	ND - 81	ND	ND	ND
Toluene	ND - 7.7	ND	ND	ND

ND: Not Detected

Q: Questionable value

FIGURE 9

SUMMARY OF CONTAMINANTS

SEDIMENTS	STREAMS FLOWING OFF-SITE	ST. JOHNS CR. ABOVE SITE	ST. JOHNS CR. BELOW SITE
INORGANICS concentrations in mg/kg (parts per million)			
Chromium	2.7 - 7	4.5 - 5.5	2.4 - 3.3
Cobalt	2.5 - 7.5	5.0 - 5.5	2.5 - 3.3
Copper	2.8 - 5	15 - 31	3 - 5
Iron	6,000 - 23,400	11,800 - 14,000	5,000 - 7,000
Lead	2.8 - 18	40 - 75	6 - 7
Nicke;	4.8 - 8	8.9	4 - 5
Zinc	12 - 64	43 - 60	11.5 - 19
ORGANICS concentrations in ug/kg (parts per billion)			
Flouranthene	ND	ND - 720	ND
Methylene Chloride	ND-2.6	ND - 6.2	ND
4-Methylphenol	ND - 1,300	ND	ND
Pyrene	ND	ND - 730	ND
Styrene	ND - 11	ND	ND

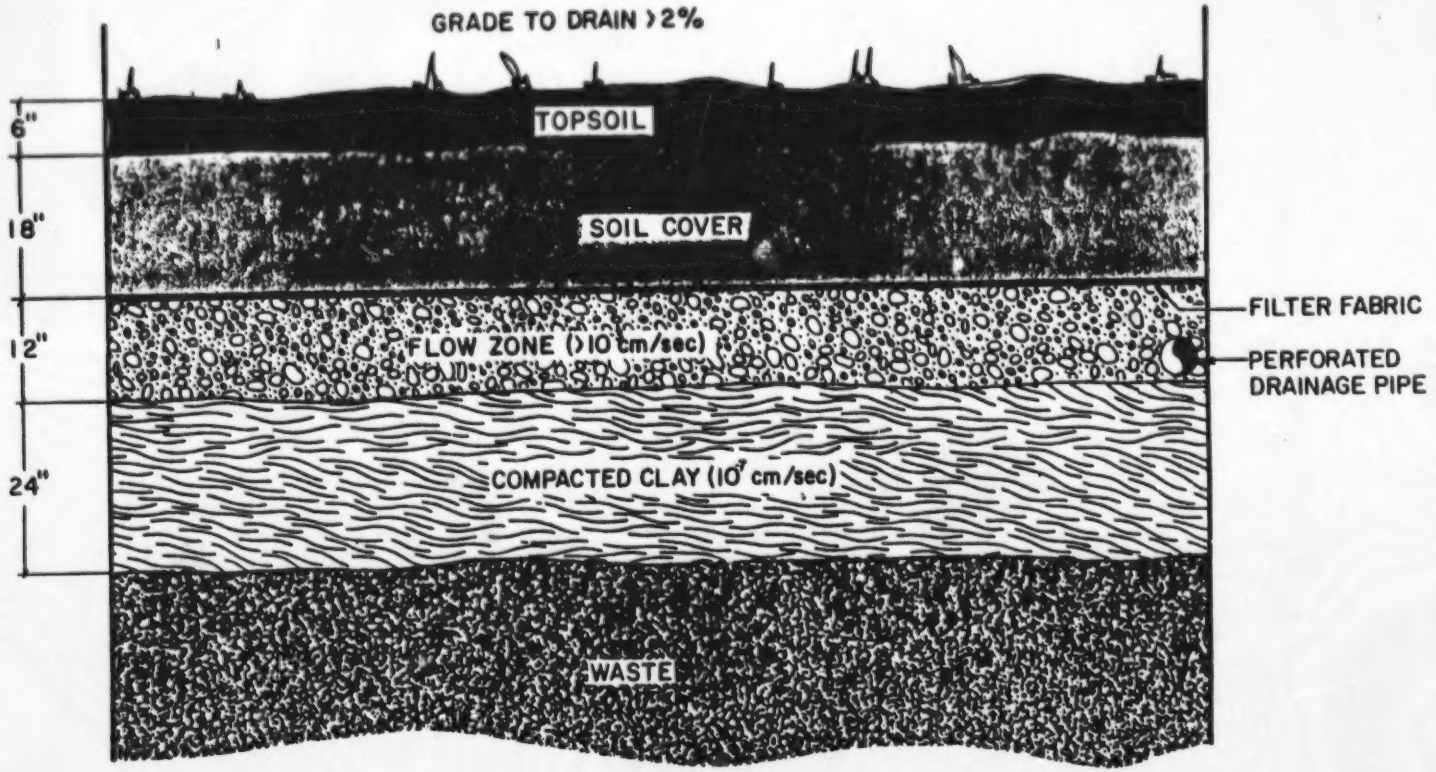
ND: Not Detected

FIGURE 10

LACKAWANNA REFUSE SITE
POTENTIAL REMEDIAL ACTION TECHNOLOGIES

Technology	Retained For Further Evaluation?	Comments
Site Remediation:		
No Remedial Action	Yes	
Surface Capping	Yes	
Surface Regrading and Revegetation	Yes	
Surface Water Diversion	Yes	
Contaminated Soil/Sediment Removal	Yes	
Leachate Collection	Yes	
Gas Collection	Yes	Passive only
Groundwater Barriers	No	Not applicable
Excavation	Yes	Partial and total
Treatment and Disposal:		
Filtration	Yes	
Precipitation	Yes	
Neutralization	Yes	
Carbon Adsorption	Yes	
Air Stripping	No	
Incineration	Yes	Existing offsite facility only
Offsite Disposal	Yes	
Onsite Disposal	Yes	

FIGURE 11



CAP DETAIL

LACKAWANNA REFUSE SITE, OLD FORGE, PA

NOT TO SCALE

FIGURE 12

FIGURE 13

REMEDIAL ALTERNATIVE	CAPITAL COST ($K)	O&M COST ($K)	PRESENT WORTH ($K)	PUBLIC HEALTH CONSIDERATIONS	ENVIRONMENTAL CONSIDERATIONS	TECHNICAL CONSIDERATIONS	OTHER CONSIDERATIONS
PIT 5							
IA NO ACTION	$0000	$43	$405	There would be continuing off-site migration of contaminants into air, groundwater and surface water. There would be a possible risk of direct contact with contaminated leachate.	There would be continuing threat to the environment by all routes further contamination of wildlife on-site and the potential of contamination of off-site wildlife and fish.	The existing gate and fence are inadequate to prevent further migration of contaminants.	There are known carcinogens present in the leachate and in the tissue of animals found on-site.
IB CAPPING, LEACHATE COLLECTION AND TREATMENT, GAS COLLECTION.	$1691	$88	$2520	There would be a continuing risk of an air release from drums rupturing below the cap. Contaminated waste would remain unconfined and would leach into the minepool below.	There would be a continuing threat to aquatic life in the Lackawanna River from potential releases into the minepool.	This method would not allow the prediction of air releases and thus, there treatment before release off-site. Groundwater monitoring is not possible to detect contaminants.	This method does not meet RCRA storage or or closure requirements.
IC REMOVAL OF ALL DRUMS AND CONTAMINATED GARBAGE, GARBAGE, CAPPING, LEACHATE COLLECTION AND TREATMENT, GAS COLLECTION. INCINERATE ALL REMOVED MATERIAL OFF-SITE	$8204	$88	$9033	This method would remove the major source of contamination: would preclude further direct contact, air and surface water releases, and would minimize groundwater releases.	This method would eliminate the direct contact threat to wildlife and the potential for off-site migration via leachate, contaminated groundwater, and surface water runoff to local streams.	Contaminants would be removed to a safe background level. Low levels of contaminants remaining would not pose a serious threat. Continuous monitoring and sampling required during construction.	By removing drums of liquids and contaminated garbage, the requirements of RCRA would be met with the cap and leachate system.
ID SAME AS IC, EXCEPT LIQUIDS ARE INCINERATED AND THE SOLIDS ARE LANDFILLED.	$6812	$88	$7641	Same as above	Same as above	Same as above	Same as above

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FIGURE 13

REMEDIAL ALTERNATIVE	CAPITAL COST ($K)	O&M COST ($K)	PRESENT WORTH ($K)	PUBLIC HEALTH CONSIDERATIONS	ENVIRONMENTAL CONSIDERATIONS	TECHNICAL CONSIDERATIONS	OTHER CONSIDERATIONS
PIT 5 (Continued)							
1E TOTAL EXCAVATION AND DISPOSAL OF ALL PIT MATERIAL IN QUALIFIED RCRA FACILITIES	$33,500	$0	$33,507	This method would eliminate all present threats to the public from contact or potential releases to the environment.	This method would eliminate all present threats to the environment from releases or wildlife contact.	All material in the pit would be removed. Liquids would be incinerated and all remaining material would be placed in a qualifying RCRA facility.	This method exceeds all requirements under RCRA.

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FIGURE 14

REMEDIAL ALTERNATIVE	CAPITAL COST ($K)	O&M COST ($K)	PRESENT WORTH ($K)	HEALTH CONSIDERATIONS	ENVIRONMENTAL CONSIDERATIONS	TECHNICAL CONSIDERATIONS	OTHER CONSIDERATIONS
PITS 2 & 3							
2A NO ACTION	$0000	$43	$405	There would be continuing off site migration of contaminants into air, groundwater, surface water, and a possible risk of direct contact with contaminated leachate.	There would be continuing threats to the environment by all routes and further contamination of wildlife on-site and potentially to off-site wildlife and fish.	The existing fence and gate are inadequate to prevent further migration of contaminants. Infiltration and groundwater mingling of the wastes can still occur.	There are known carcinogens in the leachate and in the tissue of animals caught on-site.
2B CAPPING, LEACHATE COLLECTION AND TREATMENT, GAS COLLECTION.	$4138	$101	$5090	Capping would remove the major source of contamination and would preclude further direct contact, air and surface water releases and would minimize groundwater releases.	Capping would eliminate the direct contact threat to wildlife and the potential for off-site migration via leachate, contaminated groundwater and surface water runoff to local streams.	The cap will be designed to accomodate the expected subsidence. The cap and leachate system will be constructed to be continuous with the cap and leachate collection system of Pit 5.	The access road would be moved to the side of the pits during capping. The cap would comply with RCRA solid waste closure requirements. State inspections and necessary maintenance will insure the cap integrity.
2C TOTAL EXCAVATION AND DISPOSAL OFF-SITE OF ALL MATERIALS IN THE PITS.	$78,942	$0	$78,942	All hazardous material and all non-hazardous waste would be removed and all potential for contact or releases would be eliminated.	Total excavation would eliminate direct contact threat and any releases into the local environment.	All excavated material would be sent to a qualifying RCRA facility for disposal.	No evidence of substantial amounts of hazardous waste disposal in these pits exists. Most waste is expected to be municipal refuse.

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FIGURE 14

REMEDIAL ALTERNATIVE	CAPITAL COST ($K)	O&M COST ($K)	PRESENT WORTH ($K)	HEALTH CONSIDERATIONS	ENVIRONMENTAL CONSIDERATIONS	TECHNICAL CONSIDERATIONS	OTHER CONSIDERATIONS
PITS 2 & 3 (CONTINUED)							
BOREHOLE PIT							
3A NO ACTION	$0000	$0	$0	The low potential for the public's direct contact with the material would continue. Releases through leaching of contaminants into groundwater is possible.	The potential for releases to surface or groundwater exist from runoff and percolation through the upper soil layer that is contaminated.	The existing fence and access gate are inadequate to prevent trespass across the borehole pit and and to prevent direct contact.	Access to the pit area is limited by steep slopes on the upper side. Surface water can be expected to pond in this area and leach contaminants into the groundwater.
3B CAPPING	$234	$1	$243	The potential for direct contact would be eliminated.	Releases to the environment may be possible by small amounts of water penetrating the cap or entering from the side slope.	Some contaminants may still slowly leach into the groundwater or into the minepool beneath the pit.	
3C EXCAVATION OF SURFACE AND CAPPING	$283	$0	$283	The potential for direct contact would be eliminated.	The potential for groundwater release would be eliminated.	Removal of relatively small amounts of soil would minimize the potential for further releases.	

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FIGURE 15

REMEDIAL ALTERNATIVE	CAPITAL COST ($K)	O&M COST ($K)	PRESENT WORTH ($K)	PUBLIC HEALTH CONSIDERATIONS	ENVIRONMENTAL CONSIDERATIONS	TECHNICAL CONSIDERATIONS	OTHER CONSIDERATIONS
ACCESS ROAD							
4A NO ACTION	$0000	$0	$0	The potential for further releases to ground and surface waters would continue. Erosion and runoff will carry soil contaminants into the streams.	Further migration of contaminants into the air and streams can be expected. Vehicular traffic on the road will hasten this migration by eroding the surface.	The present road is inadequate to handle the construction traffic without upgrading. Serious erosion could be expected if no action was taken to improve the road.	Surface water control as well as soil erosion measures would be needed to control further degredation of the road and the associated release of soil contaminants.
4B EXCAVATION, DISPOSAL OFF-SITE	$284	$0	$284	The potential for release will eliminated.	The migration of contaminants into the environment will be eliminated.	Removal of surface soil would minimize further releases and the road upgrading would minimize further erosion.	Disposal would be in a qualifying RCRA facility. The upgraded road would also have improved surface water and erosion control measures.
4C EXCAVATION, DISPOSAL ON-SITE	$34	$0	$34	The potential for release will be minimized.	The migration of contaminants into the environment will be minimized by the proposed cap and leachate collection.	The soil is not considered to be highly contaminated and could be adequately contained in Pit 5 or Pits 2/3	The pits are not easily monitored for groundwater contamination and adding more hazardous waste to them increases the risk of releases.
PAINT SPILL AREA							
5A NO ACTION	$0000	$0	$0	The potential for direct contact or the removal of this material by an individual for fill will remain.	The spill hinders the growth of ground cover and increases erosion potential which carries other contaminants off-site.	It is possible that local citizens could inadvertantly excavate the paint if they try to obtain fill from the area.	The possibility of direct contact and the accidental excavation of the spill is likely since the spill is in an easily accessable area.

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FIGURE 15

REMEDIAL ALTERNATIVE	CAPITAL COST ($K)	O&M COST ($K)	PRESENT WORTH ($K)	PUBLIC HEALTH CONSIDERATIONS	ENVIRONMENTAL CONSIDERATIONS	TECHNICAL CONSIDERATIONS	OTHER CONSIDERATIONS
ACCESS ROAD							
(Continued)							
5B EXCAVATION, DISPOSAL OFF-SITE	$2	$0	$2	All potential contact with the material or surrounding soil will be eliminated.	Ground cover could be reestablished and erosion controlled.	The spill is very small and removal could be accomplished quickly by standard methods.	The spill is a RCRA hazardous waste and should not be placed in the pits which we would have excavated and removed RCRA wastes.

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Lackawanna Responsiveness Summary

The Lackawanna Refuse Superfund Site is located on the border of Old Forge Boro and Ransom Township in Lackawanna County, Pennsylvania. In the Nineteenth Century the site was extensively strip mined, and during the 1970's it was used as a municipal and commercial disposal site. Industrial waste was also dumped at the site. Wastes were buried in three former mining pits, numbered 2,3 and 5. The types of industrial and potentially hazardous wastes discovered at the site include toxic metal compounds, various solvents, oils, paints and thinners, various sludges, organic acids, rubber compounds, coolants, and other organic wastes. Barrels of industrial and hazardous waste are buried in Pit 5. The exact number of barrels is unknown, but is estimated to be in the area of 15,000 drums. The two main environmental concerns associated with this site are: detrimental health effects from direct contact with substances disposed of on-site, and contamination of air, surface water, soil or groundwater through migration of hazardous substances.

The Boro of Old Forge is a middle class community of approximately 9500 residents. Strong citizen interest in the Lackawanna Superfund site developed early in the project. EPA officials met with local officials and toured the site in June of 1983. Several state and federal-elected officials have also visited the site, and have become involved in the citizen's actions against the site.

A very influential citizens' group formed in Old Forge. They have been active through the Immediate Removal Measures, and throughout all phases of the Remedial Investigation and Feasibility Study. The Mayor of Old Forge appointed the citizens group, known as the Old Forge Toxic Waste Removal Committee, as the official representatives of the community.

The Old Forge Boro Hall and the Committee are two repositories for all EPA official documents pertaining to the Lackawanna Site. The citizen group corresponds with EPA officials on a regular basis, and has made a point of being a part of all activity at the site. Through the Lackawanna County budget, the Boro of Old Forge budget, private donations from residents, and fund-raising activities, the Old Forge Toxic Waste Removal Committee retained a consultant from Environ, Inc., an environmental consulting firm located in Princeton, NJ. This consultant, along with the Committee, reviews EPA reports and comments to the Regional Office, in Philadelphia.

An Immediate Removal action installed a fence around the site. That measure was taken October-November of 1983. Some citizens and committee members assembled at the gate on the access road to the site. They were concerned about possible air releases when the work was being done. They wanted the children to be evacuated from Old Forge as the work continued. Because of the nature of the work, evacuation was not necessary.

The first public meeting to discuss the Lackawanna Workplan, was held in August, 1983. About 600 residents attended the meeting and voiced strong concerns about the site. Their main concerns centered on how EPA's work at the Lackawanna site would affect them, their families, and their environment. Health and safety concerns were most prevalent. The residents asked questions about their groundwater, and about the chances of leachate migrating into their water system. Specific questions concerning radiation, toxic gases, health effects, and air releases were also raised. Testing showed radiation at background levels, during all work at the site.

The community was told by EPA officials that health and safety plans would be assured under the contingency plan. Since the residents obtain their drinking water through a public system derived from reservoirs several miles to the north of the site, ground water contamination is not an imminent health threat.

One month later, in September, 1983, a public meeting was held to dispel rumors that began within the community regarding the EPA's next course of action at the site. That meeting went rather smoothly, and about 250 residents were in attendance. In April, 1984, EPA held a meeting to discuss trenching that was to take place at the end of the month. The purpose of the trenching was to see if any drums were dumped in pits 2 and 3, since we were aware that drums did exist in pit 5. The pits were trenched 10 feet deep, and no drums were found. It was decided, due to high citizen concern, that the work would take place over the weekend when school was not in session. During the on-site work, several interested citizens and members of the citizens group met with EPA's Public Affairs staff and other officials to discuss the progress of the work. Press and media interest was very strong during the trenching, as it had been from the beginning of the project. The local citizens group took a very active role in relaying information to the residents of Old Forge. In May, 1984, EPA officials met at the home of the Chairman of the citizens group. We went through the draft Remedial Investigation Report with the committee, and also discussed the Wildlife Study that had been conducted at the site by the U.S. Fish and Wildlife Service. This informal, small group gathering proved very helpful -- the committee repeated their concerns about groundwater contamination, and future health effects from site contamination. Many of the Old Forge residents

hunt deer near the site, and were pleased to see that a Wildlife Study was being done. The Committee traveled to Washington DC on July 12, 1984, to meet with Lee Thomas, who was EPA Assistant Administrator for Solid Waste and Emergency Response, at the time. The Old Forge residents gave Mr. Thomas a list of 10 "demands". Their concerns were answered during the meeting, and a written copy of the response was sent to the committee, and to EPA Region III.

The Regional Superfund Project Manager was asked to attend the committee's regular Sunday night meeting on September 25, 1984. The meeting went well and most of the concerns centered on technical aspects of the project. They wanted to know how deep the next round of trenching would be in Pits 2 & 3, and they asked questions pertaining to the health and safety procedures that were planned for the work.

In October, 1984, a public meeting was held to discuss the findings in the Remedial Investigation Report, and additional trenching in Pits 2 & 3. Approximately 75 residents attended the meeting. The citizens group made a statement before the close of the meeting requesting that all barrels be removed from Pit 5.

At the end of October, into early November, Pits 2 & 3 were trenched 30 feet deep, and no drums were found. The work began on a Wednesday and lasted through Sunday. Due to high citizen concern about the safety of their children, and a lack of enough school buses to evacuate schools in the case of an emergency, the local school board decided to close school Wednesday through Friday during the trenching.

The residents of Old Forge and EPA officials were in contact quite often in the months leading to development of the Feasibility Study. On February 8, 1985, a small meeting was held in Philadelphia with 5 committee members, EPA officials and a representative from DER. Also in attendance

was a representative from U.S. Senator John Heinz's Office. The Feasibility Study was distributed, and a representative from U.S. Fish and Wildlife Service was present to discuss the Wildlife Study report. At that time, EPA also discussed the Regional recommendation to remove all barrels from Pit 5.

After 5 hours, and quite a bit of discussion, the committee left, pleased with our recommendations.

The final public meeting to discuss the Feasibility Study was held February 28, 1985. The committee distributed form letters for the residents to sign, supporting the EPA's recommended alternative. Many residents wrote their own comments on the back of the form letters. We received 200 signed form letters from the residents of Old Forge. Fifteen of the letters included written comments by each resident. Six of those comments concerned future ownership of the property once the cleanup is complete. Five residents asked who would monitor and maintain the treatment system, and three letters that we received showed great concern about the timeframe of the project from start to finish. Most prevalent among those comments was the transportation of hazardous material. Specifically, what route would be taken and in what kind of vehicle the materials would be hauled. Other concerns centered on health and safety precautions that would be taken by EPA to assure residents' safety, and the residents were concerned with continued monitoring and maintenance of the treatment system after the work was complete. These written concerns will be answered once the design phase of the project is complete. Included in the comments that

we received were letters from a Pennsylvania State Senator, a Pennsylvania State Representative, the Lackawanna County Emergency Management Agency, the Borough Council of Old Forge, and a formal statement from the Old Forge Toxic Waste Removal Committee. All of the letters were in favor of the EPA's recommended cleanup alternatives for the Lackawanna Superfund site.

Throughout the comment period, which ended on March 7, 1985, residents were encouraged to contact EPA's Region III Offices with any questions that they had pertaining to the Lackawanna site.

During the early and later phases of design EPA officials will meet with the Old Forge Toxic Waste Removal Committee and their consultant from Environ, Inc. to discuss ideas for both the design and construction phases of the project. EPA will also discuss with the Committee and their consultant safety measures that will be taken during the project.

After the design stage is complete, a public meeting will be held to discuss what will take place during the construction stage. At that future meeting, we will be prepared to address the concerns of the residents pertaining to the transport of hazardous materials throughout their community.

EPA Region III will continue to update the media and the residents of Old Forge should any questions arise during the design stage of the project.